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NEWS IN BRIEF

U.S. House Gets Index Of Watergate Data

WASHINGTON, D.C. — A computerized index of all the testimony taken by the Senate Watergate committee has been turned over to the House for use in its presidential impeachment inquiry.

During its hearings — and behind closed door meetings with possible witnesses — the Senate group, headed by Sen. Sam Ervin (D-N.C.), kept a complete index of the possible involvement of the President and others in the Watergate burglary and coverup.

Two tapes containing an index of the voluminous material recorded by the committee are now in the hands of the House investigators looking into the possible role of the President in the case as grounds for impeachment.

The system runs on IBM 370/155 computers at the Library of Congress.

IBM Sees Government Files As Test for Privacy Guides

CW West Coast Bureau

SAN FRANCISCO — The first step in establishing guidelines for the protection of privacy might be to focus on government files as a test bed, an IBM data security expert suggested.

Larry Thomas, director of data security programs, also said IBM favors privacy legislation but cautioned that such legislation should embody uniform ways of treating data bases.

Thomas, speaking at an IBM press seminar on the quality of life, maintained that IBM and other computer manufacturers "would welcome the resolution of privacy issues and clear guidelines so we could harness the technology around those guidelines."

Any guidelines, he cautioned, should take into account that no single piece of legislation can implement all of them.

The Goldwater bill on privacy, he said, risks defeat because it treats all data bases the same way.

Much of the raft of privacy legislation, Thomas said, could be premature, and some state legislation could create conflicts where data crosses state lines.

Thomas listed four principles that IBM considers necessary for any privacy legislation:

- The individual should have the right of access to identify information about himself and know how it is used.
- He should have the ability to correct the record about himself.
- The individual should be able to prevent unauthorized use and disclosure about him without prior consent.
- The custodian of the files must be concerned with reliability and must ensure that precautions are taken to prevent misuse.

3340 Gets Fixed-Head Capability

By Vic Farmer
Of the CW Staff

WHITE PLAINS, N.Y. — IBM has married fixed-head and floating-head technologies in one module with its announcement last week of an upgrade to the 3340 disk system.

IBM inserted into the 3348 Model 70 data module used with the 3340 drives a fixed read/write arm that covers five of the 696 cylinders in the pack, and this enhanced module plus a drive option provide the user with access to 500K bytes of data without the characteristic time delay of positioning moving heads.

Access time for the moving head is 25 msec and less than 10.1 msec for the fixed head. The cylinder arrangement gives 69.3M bytes of moving-head storage.

Memory Hierarchy

The fixed-head module — called the 3348 Model 70F — gives 3340 users a hierarchy of disk memory within which frequently used information such as the index portion of an Indexed Sequential Access Methods (Isam) file could be allocated to the fixed-head storage area and the data portion allocated to the moving-head area.

The fixed head would read the index entries while the movable head would remain in the data area — which would eliminate the time required to move heads back and forth.

Previously, users have approached this level of efficiency by means of either a drum memory, or more recently by use of the IBM 2835 controller with its 2305 fixed-head disks for frequently used data in combination with IBM 3330s for mass data storage.

Typically the availability of this combination of auxiliary memories has been limited by IBM to larger CPUs, and here again IBM will not offer the 3340 fixed-head option to 370/115 and 370/125 users even though they can use the basic 3340 drives. The 2305 disks, for example,

(Continued on Page 8)

IBM 'Key' School Pacts Bared

By E. Drake Lundell Jr.

Of the CW Staff

NEW YORK — IBM went to considerable lengths during the late 1960s to keep — or install — its computer systems in "key prestige universities," according to internal IBM memos released as part of the deposition record of former Chairman T. Vincent Learson in the U.S. antitrust case against IBM.

In addition to across-the-board educational discounts for installed systems, the moves apparently involved free machines to specific prestige accounts and a tie-in of IBM research money to the amount of IBM equipment installed at a university or college.

At one point, the memos show, the firm rejected the idea of gratis machines to the top 30 universities in the country in favor of an increased educational allowance that went up to 40% on some machines.

But even while it was offering this discount across the board, the firm also allowed three universities to get free equipment — MIT, Cal Tech and New York University — and the managers of the Data Processing Group were told to draw up a five-year plan for future gratis machines.

The tie-in of contract support to the amount of equipment used from IBM can be illustrated in the following paragraph, part of a memo from Herman H. Goldstone to Learson:

"Brown (of MIT) pointed out that under the new contract MIT will be spending \$5 million a year with IBM... He says that as a result of the new

(Continued on Page 8)

Calif. Sued Over Teale, Sanders Calls Pact Illegal

By E. Drake Lundell Jr.

Of the CW Staff

SACRAMENTO, Calif. — State officials "condoned an unlawful tying agreement" on the part of IBM during the bidding of the Teale Consolidated Data Center, thus making the entire award illegal, according to a suit filed here recently against the state by Sanders Associates.

Sanders charged that state officials not only gave into what it called illegal IBM demands, but also that state officials had unwritten requirements in the contract that were not disclosed to other vendors.

Sanders asked the court here to overturn the portion of the contract that deals with CRT display terminals, or to overturn the entire contract if it is not possible to reverse that one portion. Sanders said IBM had threatened to withdraw its bid for the project management and software conversion portions if Sanders' equipment was chosen over IBMs.

The controversial contract, for a computer center that is to be the first of five

in a state consolidation move — was awarded to IBM last year and is initially valued at \$20 million even though the work on the center could amount to \$40 million over the next few years.

Three Violations

The suit essentially charged three separate violations on the part of state officials in charge of the bidding process.

First, it said, the officials used "arbitrary and undisclosed" bid conditions in their evaluation of proposed systems "which required that bids for a portion of the hardware for the system would have to be 10% lower than those bidding for the entire system."

Secondly, Sanders charged that normal good bidding practices would have forced the state and the officials concerned to give due consideration to any of the bidders, especially if their bid were lower than any other.

And finally, Sanders charged the state "condoned an unlawful tying agreement by not resisting and rejecting the threat of the selected vendor [IBM] to withdraw its proposal for services to implement the Teale Center and, therefore, entered into an unreasonable agreement in restraint of trade."

Sanders' Discovery

Sanders said it discovered the requirements (Continued on Page 2)



(CW Photo by E. Bride)

Frisco Feedback

Attendees at the San Francisco Computer Caravan try out Datapoint's terminal during show's three-day stopover. Other Caravan coverage on Page 4.

On the Inside

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With DP Decision-Making — Page 9

IEEE Intercon Panel Sees
Computing Costs Declining
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Vendor Resources, Software Adaptability Important in Package Selection

PRINCETON, N.J.—A source maintenance system is one of the most heavily used software packages a computer installation will ever invest in, according to ADR, the Princeton software house. At most installations, its frequency of use over a long period of time will exceed even that of IBM's compilers and the linkage editor. An equally important consideration, says ADR, is the potential life span of the source maintenance system. Once a computer installation becomes dependent on it, the maintenance package is likely to be an integral part of their operation for many years to come, through all kinds of environmental changes and equipment upgrades, such as S/360 to S/370, DOS to OS, and 2314 to 3330 or 3340 discs. The vendor must have the resources, and the software must have the versatility required to adapt to these changing conditions.

New File Design Developed

ADR's source maintenance system, The LIBRARIAN, has undergone evolution-

ary development since the 15-year old independent software house first introduced it five years ago. Initially it operated under OS and supported tape libraries only; subsequently a DOS version was developed, followed by support for random access disc libraries in both the OS and DOS versions. Recently, a new storage technique known as AFO—Advanced File Organization—was incorporated into The LIBRARIAN. This technique is designed to optimize performance when libraries are allocated to the large-capacity 3330 and 3340 discs. AFO, which required over 3 man/years of development effort, features a "floating directory" which automatically increases its capacity as an installation's storage needs grow. The new technique, which is conceptually similar to VSAM, obviates the need for reorganization or periodic maintenance of direct access libraries.

Facilities for Updating and Backup

The LIBRARIAN provides a number of features for programmers, including

updating commands that operate on complete statements or strings of characters within statements. Programmers can make temporary or permanent changes to a source program and pass either test or production versions of a program to any of IBM's language translators. Facilities are provided to protect against updating an out-of-date or mis-named program, and to prevent redundant application of the same set of changes. All changes successfully applied are summarized and printed in a supplementary report; each statement changed has the date of change permanently associated with it for auditing purposes.

The LIBRARIAN provides facilities for the creation of disc libraries and for initial loading of data into these libraries from cards or from libraries supported by other maintenance systems. Manual or automatic back-up and restoration of libraries is supported, and several levels of security are available for protection against unauthorized data access or modification. Also supplied with

the system is an interface to IBM's TSO; other ADR software products are equipped with interfaces permitting them to directly access data stored under The LIBRARIAN.

The system is installed by ADR field personnel and is available under monthly or permanent licenses which incorporate a 30-day no-obligation acceptance period.

Context Editing Aids Program Maintenance

PRINCETON, N.J.—The ability to make character string substitutions is an important characteristic of any source program maintenance system, according to ADR. All time sharing systems support this feature, and it is equally important in a batch-oriented program like The LIBRARIAN. Character string substitution, or context editing as it is sometimes called, involves searching a file for a designated string of characters, and when located, substituting a second character string for the original. Other characters in a record that is context edited are expanded or contracted according to the relative length of the two strings involved in the operation.

Used in Global Operations

Context editing is highly useful when making global changes to a source program. For example, if a data name in a COBOL program is changed, all procedure division references to that name must also be changed. Context editing allows a programmer to replace all occurrences of the old data name with the new name in a single operation. A summary printout of all records modified by the edit function is produced for verification purposes. In addition to its value in program maintenance activities, context editing can be quite useful when preparing and modifying textual material such as memoranda or narrative descriptions of programs and systems.

Source Maintenance System Nears 1200 Installations

PRINCETON, N.J.—ADR reports that its source program retrieval and maintenance system, The LIBRARIAN, is installed at almost 1200 sites throughout the world, making it the most widely used program of its kind. In addition to sites in almost every state in the U.S., including Alaska and Hawaii, The LIBRARIAN is heavily used abroad. France and Canada top the list of foreign countries with multiple installations of The LIBRARIAN, followed by the Scandinavian countries, Switzerland, and Belgium. The system is also in use at computer installations in Brazil, Japan, and Australia.

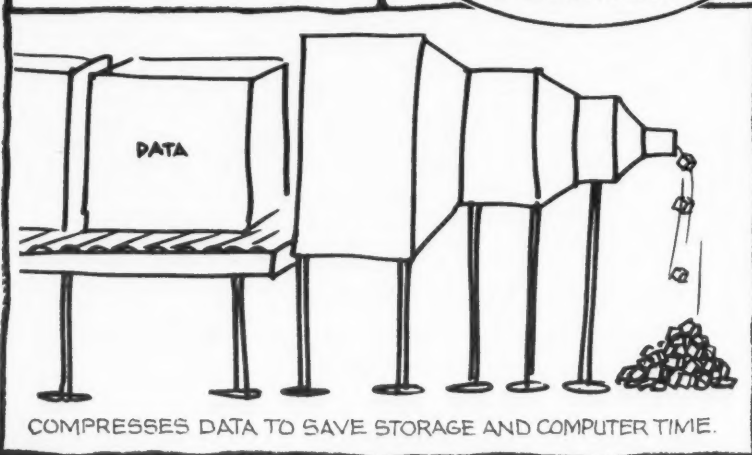
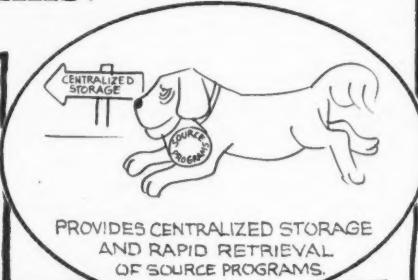
Supports Many Devices

The LIBRARIAN was first introduced by ADR in 1969. It operates on IBM S/360 and S/370 under OS MFT, MVT, VS1, and VS2. The DOS version operates with POWER and GRASP and under DOS/VS. Devices supported include all types of tape drives and 2314, 3330, and the new 3340 disc drives.

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Print Quality, Training, Too

Document Design Crucial to OCR

SAN FRANCISCO — In no other area of data entry is document design as important as in optical scanning, Peter Vergara, assistant vice-president for system development at the Bank of California, told a Computer Caravan workshop last week.

In listing the main requirements for operating an OCR system, Vergara noted the Bank of California uses its IBM 1287 OCR equipment to process some 40,000 source documents daily for a large oil company. One problem, Vergara said, is that the bank does not control the

printing of the forms.

"We had a hard time convincing the customer that he had to use a certain color non-reflective ink," he said. "They didn't like it because the blue clashed with their logo."

Design Affects Throughput

Vergara listed paper stock, reference marks and size considerations as other factors impacting document design which, he said, directly affects throughput.

The other requirements for operating an OCR system he included were:

- Print quality.
- Training.
- Error correction, which he said probably entails the use of another machine. Bank of California is currently using key-punch machines, but is considering going on-line with CRT equipment.
- Throughput consideration.
- Programming.
- Feedback reporting — to control errors. This, Vergara said, is a must for quality control in a numeric handprint environment.

Getting Along With Vendors

ANAHEIM, Calif. — Success in a multivendor environment is based on making the vendor realize he has almost as much to lose as the user if he doesn't perform, according to users at a Caravan seminar on multivendor installation management problems.

Isaac N. Main of California State University and Colleges told users a good, solid relationship with vendors will resolve many potential problems.

"But you have to know more than all of them," he said.

"You have to be able to diagnose your own problem. You may have to invest in some test gear or technical skills to be able to point your finger at the problem."

"Otherwise, they will point fingers at everyone else."

Participants indicated they found it was better to have one person doing maintenance if possible.

If a local or regional support person doesn't respond, Main suggested the user escalate his protest to higher and higher levels of management until results are obtained.

He said halting payments may be necessary and cited a case where lease payments were made to the FCC instead of the vendor pending resolution of a problem.

Users Concerned With Physical Security

By Toni Wiseman
Of the CW Staff

SAN FRANCISCO — Despite the controversy stirred up by the Equity Funding scandal, a random sampling of users at the Computer Caravan here indicated that although there is concern about data security, the main precautions taken so far by users have been in the area of physical security.

The data processing center for the Space Applications Corp. is so isolated that it doesn't present much of a security problem, according to James S. Hanson of the firm.

Data security is a problem, he acknowledged, but he said one company he knew of had worked with IBM on resource security and "they found that overhead encountered in installing a foolproof system is prohibitive."

The small user is more concerned today, aware of the problems, he said, noting that vendors will be finding it more difficult to sell systems which don't guarantee the integrity of the data.

"But," he said, "realistically, there is too much variation from

system to system and installation to installation for there to be 'one' answer to security. And anything else, we can't afford."

Hanson suggested that minis, as low-cost systems which can be wholly integrated within a company, within one location, present an attractive solution to many control problems.

"Whereas before you had to go to a sharing company because of the high cost of storage," Hanson said, "today you can totally isolate your data base with a mini system."

Many companies rely on off-site backup storage as a means of



Yundt



Hanson



Requero

CW Photos by T. Wiseman

security, mainly guarding against the hazards of fire, according to Lon Kuehl of Prudential Overall Supply.

"We have a backup set of tapes in a vault on-site and another set in a vault off-site," he said, "and really no security apart from that, except for a locked door at night."

Rene Requero of McCormick & Co. said his firm also relies on remote site backup for file and program storage.

"Most of our files are on-line all day long," Requero said, "so any DP staff can probably get at it if they want."

Requero added that his company is considering instituting some type of software protection because during conversion it found programs were missing. "We're evaluating a package from Panvalet right now," he said, "to try and control our own people's access to program and files."

"We've always had a password system as part of our security," said L.C. Kestrey of the Los Angeles Department of Water and Power, "but we're seeing it enforced more today than before."

Aside from that, he said, security changes have really only been physical, such as replacing

glass walls with solid ones with locking doors.

But, in the opposite direction, William Yundt of the Stanford Center for Information Processing stated his center had relaxed its physical security.

"We had a lot of student unrest three years ago, and the computer center was always a prime target," he said, "but today things have calmed down a lot so we can cut down on the chain

CW Inquiring Photographer

fences, the extensive outside lighting and the roving guards."

All the security measures, he said, had detracted from the effectiveness of the computer center because they made it difficult for the users to get into the user preparation areas. "The tighter the security measures, the harder it was for students to get in, but also for users to communicate with the DP staff," he commented.

Today, he noted, the main problem is not with destruction of data and equipment but with students "poaching" or using someone else's number to avoid being billed for computer time.

Watch Specs in Choosing Equipment

By a CW Staff Writer

ANAHEIM, Calif. — Careful use of written specifications and preplanned evaluation procedures will help users select equipment that is most appro-



priate to their needs, John P. Elliot, manager of research, systems and planning for the Los Angeles Department of Water and Power, told a Computer Caravan workshop here.

"Equipment selection proceeds in a series of steps," Elliot said,

"each leading to a more complete definition, or specification of the functions that must be performed," and the way in which they are to be carried out.

"As the equipment study proceeds, the specs become progressively tighter and the number of alternatives shrinks," he added, "until you are left with only one solution, and a specification that is almost a detailed contract."

The first step is to write down a statement of one's initial objective, using functional terms, and including constraints, he said.

Then comes a brief literature search to identify the types of equipment which might meet

the user's needs, Elliot stated.

After that, the user must re-evaluate his objectives, and think of alternative ways to achieve them.

Those concerned in the company should review the objectives and the different approaches until there is substantial agreement, Elliot stated.

For each alternative, the required and desirable functional characteristics of the equipment needed must be defined, Elliot continued. Then constraints for the equipment must be listed.

In the equipment specifications the user prepares, "include the contractual terms and conditions you desire, delivery dates expected and any technical installation support you may need," Elliot remarked. Then "write down a plan for evaluating the alternatives and reaching a decision."

After having prepared specifications for each alternative, and estimated the likely cost from published sources, the interested people in the organization should review the plans.

Then the user can contact potential vendors, Elliot said.

After the vendors' response the user should do a rough evaluation to find the likeliest alternatives and then concentrate on the best of these, and rewrite the specification in more detail, Elliot said.

This specification is almost a contract. It must go back to the vendors for their proposals.

The next step is to negotiate a contract, he continued.

"If the terms are complex, the exposure to loss large, and you are inexperienced, it would pay to obtain professional counsel experienced in computer contracting," Elliot advised.

Staff Training 'Worth Price'

SAN FRANCISCO — The dollars spent on training entry- and management-level personnel are more than justified in terms of efficiency and decreased turnover.

That was the consensus at a Computer Caravan User Forum panel here on personnel in which career pathing and careful evaluation were stressed.

Paul Osborn, manager of data processing, Amfac Merchandising Corp., Brisbane, Calif., said his firm spends \$400/mo for training — video assistance and textbooks — and the amount "was more than justified by the dollars saved in improving technical skills."

Osborn said: "Before we sell or evaluate or train, we must ask how good do we want the people to be... We must look for the best possible people we can get and examine our own expectation."

He cited a new formalized, structured, career pathing method for technicians and management personnel that gives a person a clear view of what to expect, and what is expected of him.

"You have to show the person visually what he has to do and what is expected of him," Osborn said.

W.E. Weeks, data processing manager for the state Department of Transportation, said California found the money spent on training extremely well-spent.

Louis Wayers, assistant to the manager of the Administration Information Services Department, Del Monte Corp., said: "Training is the most valuable aspect of developing personnel. We spend \$36,000/yr for EDP training and also encourage personnel to attend seminars."

First Justify On-Line Move

SAN FRANCISCO — "If you don't have to go on-line, don't."

That advice came from Jed Allen, manager of systems development for Management Systems Corp., Salt Lake City, as he told users at a Caravan seminar on data entry of an installation that saved \$25,000 a month by switching to a key-to-disk system.

However, Allen warned not to go to key-to-disk unless it can be justified, and justification will depend on the volume and the environment.

Management Systems Corp. switched to a Four Phase Systems key-to-disk system from a Flexowriter match-merge process.

The installation includes six systems with 83 terminals, used to handle the Mormon Church's genealogical records.

The system was selected partly because it offered a large character screen which suited the church's application.

During the discussion, it was brought out that training for the key-to-disk system is simplified in that the screen can portray the actual form the operator is using.

However, Allen said that while expanded prompting is helpful initially, it is not really necessary after the initial training period and may actually be distracting to the operator.

Operators get up to speed on key-to-disk in from three days to a week, according to Allen and other participants in the discussion.

Floppy disk, he said, has been found to be advantageous because it is possible to get stand-alone units fairly inexpensively.

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Universities Take New Options

Educational Allowances Drying Up

By Molly Upton
Of the CW Staff

CINCINNATI — The glamorous days of the sixties are gone and the stingy days of the seventies are here for university DP centers, according to Dr. Robert Caster of the University of Cincinnati and director of the Southwest Ohio Regional Computer Center (Sworccc).

With tightened federal grants and decreasing enrollments, he explained, academic administrations are clamping down on computer equipment expenditures.

In addition, the discount by IBM to universities has decreased from 60% to 10% since 1966, he lamented.

"When you have over \$1 million tied up in software, it's pretty hard to jump" from one mainframe vendor to another, he noted.

Sworccc runs its PL/I programs on a leased 370/165.

Caster suggested that other vendors

should offer educational allowances. Thus IBM would be competing on equal footing with other vendors, rather than being hit by the Justice Department for its marketing methods.

Universities "truly have been the ones that suffered. If we could have made up the difference with another vendor, that would have been fine, but we didn't even have that option," he said.

"With the same budget dollars we're spending now we could have a much larger system under the old ground rules. We'd give a lot better service, a lot better turnaround, and we would enhance research. Now we degrade it," Caster complained.

The decline in educational allowance from IBM has made many universities "take options that we wouldn't have taken or did not have to take seven years ago," Caster commented.

"We've had to look at third-party leases,

foreign vendors that won't give us the same support but will give you seven-year marriages with hookers. In this type of technology, you can't afford to be locked into anything for seven years," he said.

Educational allowances have fallen off from other suppliers of terminals and modems as well. Now "we're treated the same as industry and the discounts are limited to large quantity purchases which we're not in a position to do," Caster ended.

IBM Key School Pacts Bared in Suit Memos

(Continued from Page 1)

contract he hopes in a few years that MIT will have with IBM a yearly business of \$10 million. He asked whether it would be possible at that time to reconsider raising the support level from \$1 million.

IBM's People

NEW YORK — In some cases IBM also had a hand in selecting the "right" people to man university computing centers, according to IBM documents introduced as part of the Learson deposition.

Herman H. Goldstine, in a memo to former IBM Chairman T. Vincent Learson, noted that he had recommended William Kehl, then director of the University of Pittsburgh Computing Center, to a position at MIT.

He was hired, Goldstine said, and would be joining the faculty of the center in the near future.

"Kehl is a good friend of ours and should materially change our relationship with the management of the computing center," Goldstine noted at a time when MIT had been going to some non-IBM equipment.

I told him that we would be delighted if our business went to \$10 million a year and that of course there would be no reason why he could not reopen the support level at that time."

Goldstine also noted: "I told Brown explicitly that we were out of patience with institutions which take our money and then go competitive. He said he not only understood but agreed with us."

In another case, Goldstine told Learson that Harvard University estimated its DP equipment expenditures were expected to rise from \$229,000/mo to \$865,000/mo over a five-year period.

"Potentially, all of this can be ours and I would like to be sure that it is," he said, suggesting that IBM renew a previous grant to the college for the next five years in order to help get most, if not all, of the business.

Another memo concerning Harvard's five-year computing program from R.W. Armstrong to Learson noted that Harvard was asking IBM for professional support that would cost IBM \$250,000/yr for the five-year period.

"Harvard's (sic) objective is to obtain a close working relationship with IBM. To achieve such a relationship, Harvard is prepared to commit itself to IBM for the next several years," Armstrong added.

IBM 3340 Upgraded With Fixed Head

(Continued from Page 1)

were limited to 370/145s and up, and the 3340 fixed-head option is limited to the 370/135 and up.

User Pays

The price for the 3348 Model 70F data module is double that of the Model 70.

The 70F sells for \$4,400 and rents for \$165/mo or \$140/mo on the extended term plan.

The drive option, which is necessary to use the Model 70F, costs \$1,900 or \$47/mo and is field-upgradeable.

For the additional cost, however, IBM hedged on just what price/performance benefits would accrue: "Performance gains are dependent on many factors unique to each user such as CPU utilization, file organization, type of data and frequency of data usage allocated to the fixed head," a spokesman said.

"But generally speaking, improved performance could be realized through increased throughput, reduced response time or additional work load with no degradation," he added.

No benchmark data, however, is to be made available until the first customer shipment of these units in the third quarter, according to IBM.

Programming for the 70F should not be difficult, IBM said, but data set placement is required to gain maximum performance advantage, and this means modification of the Job Control Language to allocate frequently used data to the fixed-head cylinders.



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Actual Patient Care Use 'Years Away'

MDs Experimenting With Computer Decision-Making

By Alexander Dumas
Of the CW Staff

BOSTON — Using a computer to evaluate vast amounts of patient data quickly and print out diagnostic suggestions at the 95% probability level, several doctors at the Tufts University-New England Medical Center are experimentally double-checking their surgery decisions on complex kidney operations.

Until computerized decision-making is perfected, according to chief physician William B. Schwartz, doctors performing these operations must lay out a traditional medical "decision tree" on a blackboard and assign numbers to each treatment option. Using these numbers, the physician makes probability calculations that influence "life and death" decisions.

Although only one or two cases of every 100 treated have problems difficult enough to require statistical analysis, Schwartz said the calculations are complex and time-consuming, and the addition of a computer to the calculation process would be a "tremendous" asset.

Another asset, added team physician Jerome P. Kassirer, is computer consistency. "Although doctors know, or can be taught through experience how to make numerical decision analyses, they are sometimes too tired, too busy or too influenced by a recent case that turned out badly."

General Agreement

Schwartz stressed, however, it will be several years before the program or others like it will be tried in actual patient care involving the "life and death decisions." So far, experiments involving 18 "hard-to-diagnose" kidney cases show the computer and the specialists are on the same wavelength.

In 14 of the 18 cases, the Decsystem-10 agreed on proposed treatment and diagnostic tests. In the remaining four cases the computer and the doctors disagreed on treatment procedures, but Schwartz indicated the computer's choice was a "reasonable" alternative.

Schwartz sees the practical use of computer decision-making as five to 10 years away, explained the team's DP consultant, MIT electrical engineering Professor G. Anthony Gorry, because of the improbability of programming good old common sense.

"In any area," Gorry stated, "there's a tremendous amount of practical, real-world knowledge that a person possesses and doesn't even know he has. That's one of the areas where machines are weakest."

"In three or four years," he continued, "we could have a computer program that would be surprisingly good, but it could be incredibly stupid at times, because of the common sense 'hole' in its knowledge."

Group Practice

Gorry explained that the program for the kidney decision making was developed jointly with the doctors, combining their medical questions and treatment options with his knowledge of statistical computation. But to fill the "holes" in the computer's common sense department, more and more "inference" types of everyday situations must be added, he noted.

"Say a woman comes to a doctor and says she has swollen ankles. This could mean many different things medically, some of them serious. But if the woman qualifies her case by saying she is a full-time waitress, the doctor can almost immediately prescribe what to do."

"For a computer to diagnose a situation like this," he continued, "the program

would have to include pieces of non-medical data in order for the machine to use only relevant medical data it has stored."

Schwartz related this need for more computer common sense to complications when dealing with highly complex kidney cases. "If a patient with a kidney failure has also been hit by a truck, a computer might come up with ridiculous answers unless it is equipped to sort out the effects of the injury sustained by the truck injury from the problems caused by the failing kidney."

For the programs to be accepted for routine use, Gorry and the doctors believe the programs will have to undergo testing that will resemble the years of testing and certification now imposed on medical specialists. "We have a lot more work to do before this time," Gorry conceded.

Mini 'Beeps' When EKGs Change

BOZEMAN, Mont. — Because a nurse can't watch every heart patient's electrocardiogram at once, abnormalities and variations in a patient's heart beat might not be detected immediately.

To solve the problem two students at a local college developed a mini-computer-based system that monitors EKGs and "beeps" when the rhythms change.

Don Jones and Jerry Stolle, electrical engineering students at Montana State University here, said the hardest part of developing the system was writing a program that could distinguish between serious and minor heart beat abnormalities.

To do this the students used General Electric tape recordings of EKGs to determine the acceptable and unacceptable heart beat rates the computer would have to recognize as it analyzed heart rhythms. The students are presently recording EKGs of coronary patients in the local hospital to learn more about heart beat ranges.

"Many people think computers are replacing people," explained Jones, "but there is no way you can do this. Our minicomputer is an aid — something that keeps a record and makes a warning if necessary while the nurse leaves her station to tend another patient."

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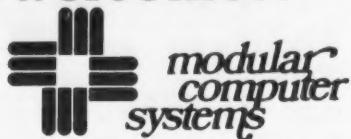
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DP Manager Salaries Outpaced By Rise in Their Employee Wages

By a CW Staff Writer

NEW YORK — While programmers and analysts are reaching record high salaries this year, their bosses' earnings remain relatively static, according to a recent survey.

Starting salaries of programmers and systems analysts in 1974 have set records, according to the annual Robert Half personnel survey, which is included in the Department of Labor's Employment Outlook series.

But at the same time, there was no increase for operations managers and DP managers in large corporations and only a slight increase for DP managers in medium-size installations, the survey showed.

Beginning programmers (less than one year of experience) in large companies started between \$11,500 and \$13,500 in 1974, according to the survey, up 13.6% from the \$10,000 to \$12,000 reported in the beginning of 1973.

Programmer analysts in large companies ranged between \$14,000 and \$16,000 in 1974, up 11.1% from the \$12,000 to \$15,000 reported a year earlier, while lead or senior programmers with a salary range of \$15,000 to \$18,000 only showed a 6.5% increase during the year.

Systems analysts ranged in salary from \$13,500 to \$15,500 in the large companies, an 11.5% increase over the previous year, while systems analysts managers increased 8.6% to \$17,000 to \$21,000, the survey reported.

However, operations managers remained at a plateau between \$13,500 and \$19,000 with no increase over the year-earlier period, and DP managers — whose salaries ranged from \$20,000 to \$35,000 — also remained in the same tax brackets as a year earlier.

Medium-Size Installations

In the medium-sized installations, the salary level was lower in terms of dollars in the 1974 study, but employees here were showing larger percentage gains over the previous year.

Beginning programmers were up 12.2% with a range between \$10,500 and \$12,500; programmer/analysts with a salary of between \$12,500 and \$15,000, were up 12.2%; systems analysts rose 14.9% to the \$12,000 to \$15,000 range; systems analysts managers were up 6.5% to \$15,000 to \$18,000; operations managers showed an 11.5% rise to the \$12,500 to \$16,500 range; while DP managers with a salary of between \$16,000 and \$22,000 showed only a 2.7% increase over the previous year.

In the smaller installations, the salaries were once again lower in actual dollars, and apparently were rising about on a par with the other two groups.

Beginning programmers here made between \$9,500 and \$10,500, an increase of 11.1% over 1973; programmer/analysts made \$11,500 to \$12,500, up 9.1%; systems analysts made \$11,500 to \$13,000, up 11.4%; and DP managers made between \$14,000 and \$16,000, an increase of 7.1% over the previous year's figures.

In all the lower-level programming jobs, the study said, 5% should be added to the average salaries for people with undergraduate degrees, while it said a 10% factor should be added to the salaries in higher-level positions for people with graduate degrees related to DP.

In all cases, the study found jobs that required substantial travel also rated a 5% additional salary over the average figures.

Robert Half Personnel Agencies is at 330 Madison Avenue.

Women Inmates Put DP Training to Use

MARYSVILLE, Ohio — Inmates at the Ohio Reformatory for Women here are being trained as data entry clerks and are putting their skills to work inputting material on traffic violations for the highway safety department.

The program, established by the Ohio Penal Industries Department of Rehabilitation and Correction, includes a week in a general education program and five hours a day on Consolidated Computer, Inc. Key-Edit machines.

Women spend about 25% of their time learning to operate the system and the other 75% keying traffic violation information.

A feedback device allows the women to see how well they are doing and to compare their efforts with others in their class.

The first group of graduates has passed the Ohio State Civil Service exams and several former prisoners now hold DP-related jobs.

"The employment possibility is quite high," observed a prison spokesman.

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Rise in Use of Robots for 'Dirty Work' Causes Concern Among Labor Unions

Special to Computerworld

CHICAGO — In order to cope with a future shortage of unskilled manual laborers willing to perform repetitive and dangerous manufacturing tasks, U.S. industry will be turning increasingly to automation or robotization of such tasks on the factory floor.

However, such moves will be accompanied by problems that are more of a social than technical nature, including union problems, according to researchers looking into the area.

The U.S. manufacturers' move into the field will follow the lead of a number of European countries and Japan, which are already experiencing a tight labor market in low-level job categories, according to Dennis Hanify of the IITRI Robot Technology Center, which has instituted a special academic program in the area.

Hanify said the development of robotization technology in Europe and Japan, while presently lagging behind the U.S., is increasing at a more rapid rate. He predicted greater interest in the field domestically as the U.S. population levels off and it becomes "difficult to find people who want to do these dirty jobs."

Hanify also pointed to increasing cost-effectiveness, brought about by rising labor costs, and increasingly stringent Occupational Safety and Health Administration work rules, as spurs to utilization.

Auto Makers at Forefront

In industrial manufacturing categories, auto makers have taken the fore in implementation of robot process techniques, Hanify said. Among European auto manufacturers, Mercedes, Volkswagen, Peugeot and Citroen have converted some of their assembly line operations to robot control, and Japan's Toyota is moving into the area.

Labor's view of adoption of robot equipment, with its potential for displacement of union members, is a point of contention.

Hanify said United Auto Workers officials have participated in robotization seminars and symposia, and he mentioned union officials' concern that "their people be given the job of controlling the robots" in plant conversion situations.

A UAW spokesman in Detroit said his group "in a broad sense... never has opposed computerization. What we're concerned with is the effect of robotization on the UAW worker." He cited the General Motors plant in Lordstown, Ohio, where the union raised no objection to the installation of 26 to 30 robot systems, "as long as there was no increase in the work pace."

But since Lordstown was a new facility and robotization there posed no threat of displacement of existing UAW jobs, it was an unusual case, the UAW spokesman indicated.

In plants where robotization raises the possibility of supplanting union members, he said, "We handle it on a case-by-case basis." He said it was the union's policy to "insist on prior consultation" before implementation of robotized systems, in order to work out union concerns and protect members' interests.

IITRI has formed a technology center for manufacturers contemplating the move into robot technology. The Industrial Robot Analysis (IRA) program will be a multiclient effort providing input

from computer technology, machine system design, management science and other fields, Hanify said. IRA, to be directed by the IITRI Robot Technology Center, will be aimed at companies new to the field who haven't yet explored the

The Second Industrial Revolution

costs or possible benefits of robotization, he noted.

Help Neophytes

Hanify said one purpose of the program would be to help neophyte manufacturers avoid a repeat of "the computer syndrome, where everybody ran out and bought one, whether they needed one or not."

A major consideration in a decision to move to robotization is cost-effectiveness, he explained, noting that robotization of a single manufacturing operation may run as high as \$100,000 or more.

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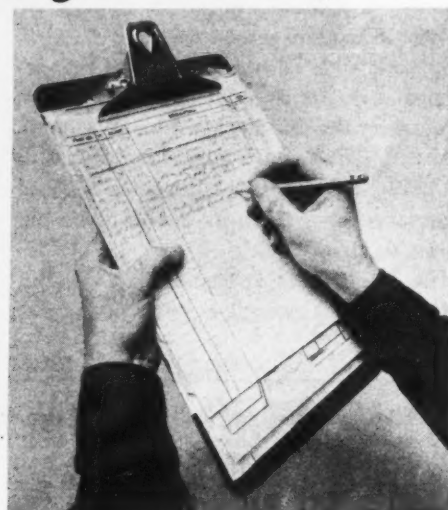
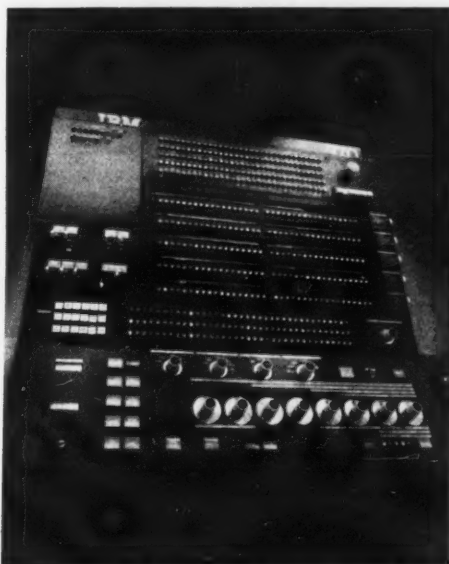
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Editorials

Export Curbs

Computerworld agrees with the reported recommendation of an industry technical advisory committee that peripherals such as 360-level tapes, disks, add-on core, printers, readers and punches be exported freely to Communist countries. Putting aside the favorable effect on vendor sales, we believe the helpful push that is given to the balance of trade, the opportunity to "show the flag" in markets where Coca-Cola and TV westerns do not penetrate, and, above all, the suppression of some of the Eastern Bloc urge to set up their own production, all warrant elimination of current restrictions.

We continue to oppose export of high-level technical know-how, in the advanced peripherals as well as in the CPU and chip technology areas. This is more a matter of industrial position for the future, rather than of national or international military security. As customers, always assuming they pay in real goods — gold, platinum, oil, sables and caviar — our Red neighbors are useful. Let's not help them to wander off or to compete with us in the Third World.

The Human Cop

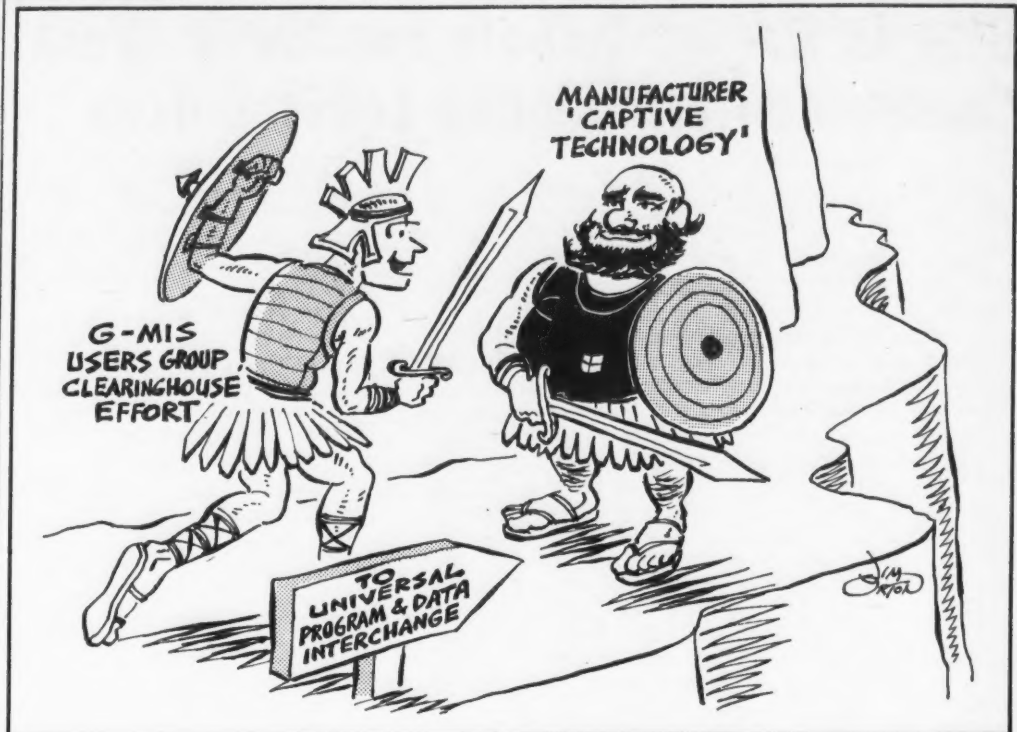
At a time when the top law enforcement officers of the land were in Washington, D.C., arguing that control over computerized criminal histories should be left entirely in the hands of the police, a story that Massachusetts policemen may have been selling such records underscored the need for some agency to oversee the police operations.

Both Attorney General William Saxbe and FBI Director Clarence Kelley argued for police control over the systems, opposing a measure that would establish an independent civilian board to oversee their use.

The Massachusetts case, however, underlined the importance of such a review, since the initial evidence of possible illegal use of the records came from an audit of the system performed by a civilian group.

Kelley and Saxbe apparently feel that police agencies and police personnel are inherently more trustworthy than any civilian board could be.

Unfortunately, this is not so. Policemen are human and subject to the same inducements and foibles as other citizens.



En Garde!

Letters to the Editor

Justice Under Law, Justice for All?

Re March 13 editorial:

Your argument in favor of computerized, hence uniform, judicial procedures is a good and necessary one. But your examples certainly do not help to support it. A system which uses only the "magnitude" of a crime (let alone its emotional impact — murdering women and children is not legally a more severe crime than murdering able-bodied men) to determine bail seems no more equitable nor uniform than the totally subjective methods now used.

Many other factors (e.g., previous criminal record, likeli-

hood — based on age, public standing, character references, past appearances, etc. — of appearance at a later date, ability to pay) must also be considered and weighted appropriately.

Paul Bent

Long Beach, Calif.

Small Systems Story Said to Favor IBM

Re "Small Systems Users..." [CW, March 27]: Equal Time Please!

I found this article most unfair, especially to Burroughs and NCR. Like any other vendor they have problem sites but they also have many satisfied users. I'm sure your staff is aware of this as it probably bypassed many happy users in its quest for the dissatisfied users portrayed in this article.

As an NCR Century 100 user for two-and-a-half years I am very pleased to say we are more than satisfied. As a matter of fact, due to increased volumes we have decided to upgrade to a Century 101. It's nice to know that the programs we are now using on the Century 100 can be run on the 101 with no repro-

gramming required. This upward compatibility feature is a big plus. Have you ever tried to upgrade from a System/3 to an IBM 370?

A newspaper as well read as *Computerworld* influences many people in the computer community, as you know. Therefore, I think it is very important that CW articles be more unbiased and tell it like it is. Your pro-IBM attitude has always been somewhat of an irritation to me as I'm sure it has to many other non-IBM users.

So, unless you are going to change your logo to say "Computerworld, the Newsweekly for the IBM Computer Community," let's hear both sides of the story.

Ms. Evelyn Forrest Thomas
Manager

Data Processing Department
Intercounty Construction Corp.
Hyattsville, Md.

Many readers accuse us of anti-IBM bias. Your opposite view is refreshing.

We'll be glad to have another letter from you, or a story, about that easy upgrade. Afterwards! HG

A Wall up to the Sky

An editorial in this issue rather conservatively expounds *Computerworld's* position on selling hardware to the Reds (we're for it), building chip factories for them (we're against it), and showing them how to make good electromechanical gear (we're not enthusiastic).

But there are mutterings in Washington of Old Pentagon ugliness to come. Years ago I was an official member of a committee that advised the Office of Export Control of the Commerce Department on the technical aspects of computer export decisions. Sid Fernbach was also a member, and has survived Nixonian vicissitudes to perform a similar function in present-day advisory activities. Faceless types from State and other concerned departments were consistently browbeaten by dastards from DOD. I was disinvented after challenging an Air Force light colonel to tell us where he got his orders, DDR&E (John Foster) or International Security Affairs (Warren Nutter); permanently disinvented!

Ancient history: I bring it up again because of a rumor CW has picked up that the White House, and Peter Flanigan in particular — the last, and always one of the least attractive, of the Haldeman/Ehrlichman Mafia — is promulgating new computer technology export restrictions. The very thought that a grisly type like Pietro is in on the act is enough to make one's flesh creep. But, far worse, we hear that there is an intention to restrict tech-

nical knowhow, technical data and technical publications. That would presumably be IEEE-CS journals, not *Computerworld*. But in any case, I'm screaming, and will scream louder when I have some facts.

Two problems: first, the intent is to restrict distribution of technical information not only to the Russians, but to countries and organizations that might in turn transfer it to them. That's just about everybody but the Portuguese!

Second, and much more important, the whole thrust of the concept is wrong. You can't classify science and technology: somewhere in Mainland China a mute, inglorious Newton is reinventing Josephson. Even in Albania! You can't wall off our competitors from the universe, nor us from the rest of the world.

Engineers of the world, unite! You have nothing to lose but your Flanigans!



Herb Gross



"We Wondered... Could You Slip Us to the Computer and Tell Us Exactly Where We Stand in All Aspects of Our Positions Here, Our Credit Ratings and Future Prospects."

Professional Practices

A Totality-of-Agreement DP Contract Usually Isn't

By Thomas K. Christo
Special to Computerworld

Probably the most common type of provision in any data processing contract is the "totality-of-agreement" clause. It is also commonly found in later arguments about whether promises have been fulfilled, with the user apparently being put in a difficult position unless he can show in the contract exactly the promise he claims has not been kept.

With the standard printed form contract he often can't do this — but this does not necessarily mean he can't recover for any valid claims he may have.

The principles are the same for users who rent or buy computers just for their in-house work — but they are slightly easier to illustrate where outside damages are involved.

Simple Simon

Take, for instance, the case of Simple Simon, a would-be user, and Donald Decept, Inc., a large hardware vendor. Simon has a credit-card application to attract customers needing on-line capability which he did not have. Decept advertised its F-127 system in *Computerworld* extolling its communication and on-line virtues.

Simon contacted Decept, and was told by both its salesmen and technical support people that "our F-127 is uniquely suited to credit card applications, such as those that you are developing. It can give

you five-second turnaround with a reliability factor of 0.01%." The salesman further stated that Decept's existing library of software could cover the application nicely.

Later, after agreement on lease/purchase

The Professional Practices Page is coordinated by Alan Taylor and the editorial department of *Computerworld*. Suggestions for articles should be sent to the Professional Practices Page, *Computerworld*, 797 Washington St., Newton, Mass. 02160.

terms, Decept's legal department drew up a contract regarding the hardware, extra charges for furnishing to Simon "such software as may be available from time to time," and a totality-of-agreement clause, saying the agreement was complete, and could not be orally altered.

Great Expectations

Later, after considerable effort and hundreds of man hours, conversion was completed with the help of Decept's technical staff, a credit card customer was signed, others were waiting in line — but the system did not fulfill its promises. Turnaround time was over 25 seconds — reliability was only 10% — and the software was unsuitable.

Simon's customer started suing, the prospects went elsewhere — the bills for the F-127 were coming in from Decept and were much higher than those for

Simon's previous batch system, and everything generally looked bad.

In particular, the Decept-Simon contract looked bad, for it did not mention turn-around time or reliability matters — just a set of hardware specifications. And with the totality-of-agreement clause, it looked as though Simon had traveled down the tunnel of conversion to a new system and had been left with nothing but the shaft.

In fact, Simon, however, had still several options open. These included:

- He could argue he was fraudulently induced into the "complete agreement" by virtue of the blatantly false representations made to him, and the fact that they concerned points which could be said to be in Decept's knowledge. However, Decept could respond that the contract was clear, and that if Simon wanted something else in, then he should have had it put in (pacta sunt servanda — contracts will be observed.)

Simon has a possible counter here because Simon was agreeing to the purchase of hardware on a lease plan — not an agreement to limit his relationships with Decept to this one contract.

Although the contract does not mention it, Simon could bring evidence about the amount of conversion support provided to show he hadn't bargained his freedom to make other contracts — and then produced more evidence to show what were the real agreements between the parties.

- If, however, Simon could not prove fraud, he could still introduce outside evidence to show, supplement or explain his contract. He thus could attempt to show what he actually bargained for was a system with a particular application and particular performance requirements (Uniform Commercial Code Sec 2-202).

- Alternatively, he might introduce the supplementary evidence to support a claim of breach of warranty of fitness for a particular purpose (Uniform Commercial Code Sec 2-315), asking both to cancel his contract and to obtain damages.

- If none of the above points worked, there would still be the theory of an implied contract to supply software for on-line credit card applications, (E.G. Murray vs Cunard Co. 235 N.Y. 162 (1923)). Such a contract, if it were breached, could mean the award of damages, including the cost of the now useless lease-purchase contract.

In short, just because a contract states it is complete does not stop valid claims of relief which an aggrieved party seeks to raise. If most contracts with the totality-of-agreement provision were really complete, they would be a lot more used than they usually are now.

The article is not intended as a guide in any specific case.

(Thomas K. Christo is a member of the Massachusetts and First Circuit Federal bars.)

CLA Facing Up to New Questions on DOS Support

The independent DOS service that started about a month ago for DOS users of Computer Lessors Association-leased machines is a clear success. The DOS support staff has been receiving about a dozen inquiries a day and has been solving about 90% of the problems, according to Jerry Enfield, leader of the DOS support team. The volume has indicated a real need continues to exist, and that a centralized staff can both effectively and economically cope with most of it.

Other calls and letters, however, have brought up some questions that Enfield cannot answer. One I received from a New Jersey reader, T. Minero, seemed to be a simple question asking how he might avail himself of the service. It turned out to be unanswerable because currently there is no way for him to obtain the service. It is exclusive to the users of CLA machines — and even they cannot guarantee its continuation because it is currently undergoing a three-month trial, with no agreement about future operations. Minero's question, while apparently unanswerable, turned out to have an answer, although not the one he might have expected. The answer seems to be for him and others like him to describe what sort of a service DOS users would value.

This column is therefore an invitation to readers to provide the input needed to define the availability and terms of such a

service. The invitation incidentally is not really from me, but from Michael Creedon, who as president of CLA has a great deal to do with the usefulness of any answer.

Creedon aims to get out an answer within 30 days of the request, which is pretty fast when you consider you are dealing with a 14-member organization. From Minero's position it means both a reasonable time-frame is possible, and that therefore it is necessary to understand the CLA position before asking it any questions.

Here is the CLA position as I understand it. The CLA is a group of leasing companies which over the past few years have come to realize they have to provide more user support, and which have a large number of systems for which they have paid IBM's full retail price, amounting to over \$2 billion.

Support, they have found, costs money, and if an individual company or group of companies charges too much for supporting the systems it ends up losing customers, not because the support is not worth the money, but because the prices of other competitors — other leasing

companies which may or may not be CLA members or computer brokers which do not provide such support — are more attractive to new customers.

Computer users, the lessors find, are also broken down into groups. The CLA members' real aim must be the maintenance of the value of their own inventory — and so they would, on the surface, be best served by supporting an exclusive market, where only CLA members are able to support DOS users.

Certainly, when it comes to the question of providing support to customers of other leasing companies there would be strong words spoken at the CLA board meeting, and the whole program of providing joint support might be lost.

Yet, there are other computers to take into account. Many users have purchased 360s, so support to them cannot be regarded as being direct support to competitive leasing companies. And the current situation appears to be that the need exists, that CLA has the capability, and that the success of the DOS support program to date and the request for its expansion suggest there should be some way around the problem.

So that is where the readers can help by suggesting ways in which support in this area (and by implication in other areas later) can be organized. Your suggestions are valuable, because while CLA has input from its members, it does not have good contact with the outside areas, which is exactly where the support may be needed.

Some of the possible questions are:

- Should support be available on a "per call" basis? Or should it be restricted to an annual premium basis?
- Should it cover both maintenance of understanding of old

problems, with answers — or should it include provision for new research? Should different prices be charged for such services?

- How should new developments be handled? Should they be excluded from the range of the service and allowed to be marketed separately?

- How can both the CLA need for a competitive edge and the user need for the best available support be reconciled?

If you think of other questions and send them to me, I will see that CLA has the advantage of your input — and that reader Minero gets the answer to his question just as soon as possible. Like him, I think the sooner the question is answered the better.

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The Taylor Report

By Alan Taylor, CDP



Input for CLA DOS Decision

The Computer Lessors Association has recently started what appears to be a useful telephone and computer-based support service for DOS users. Such a service is not available elsewhere. It is financed by CLA members to help maintain the value of their inventory of IBM System 360s. Requests for the expansion of the service to other 360s — not owned by CLA members — are now being received and being considered by CLA.

Under these circumstances:

(1) Should CLA respond positively to such requests?
() Yes () No

Please explain your answer.

(2) How should CLA members protect their own interests?

(3) What value would you put upon a DOS support service?

(a) On a per-call basis. () \$10 () \$25 () \$40 () \$60

(b) On a prepayment basis (% of rental).

() 2% () 4% () 6% () 8%

(4) Would you be interested in obtaining DOS support service, if it becomes available? (Do not answer unless you run a DOS installation)

() Yes

() No

Comment _____

Name _____

Position _____

Address _____

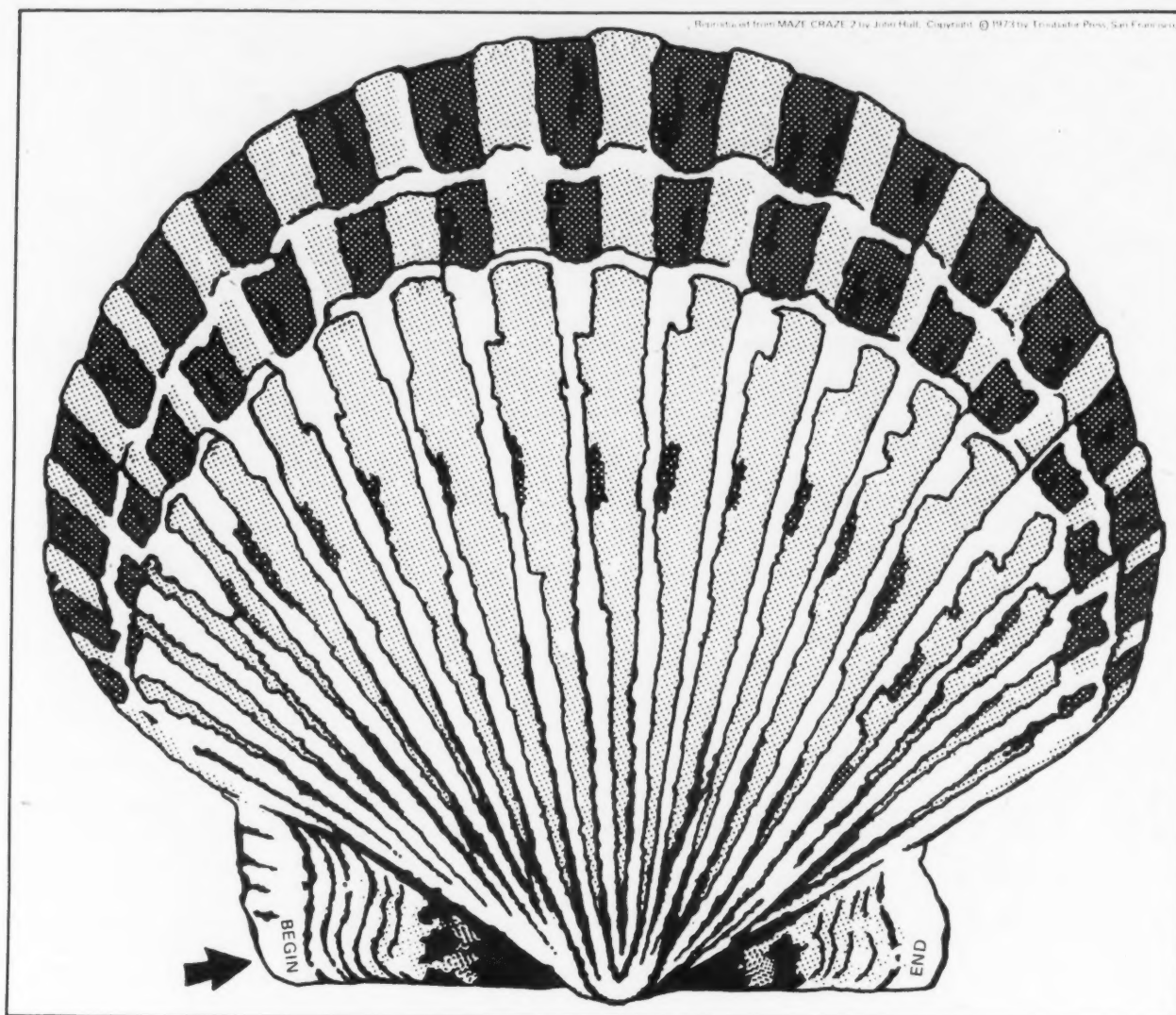
Please return to Alan Taylor, Taylor Reports, c/o Computerworld, 797 Washington St., Newton, Mass. 02160.

I read with interest your recent article describing the Computer Lessors Association's DOS support service.

Could you possibly furnish me with additional information regarding how we might avail ourselves of this service, including whom to contact, costs involved, etc. — T. Minero, director of data processing.

The letter seemed unanswerable, as the DOS service is only available to CLA members. But an answer was possible.

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Library Access Must Be Secure

TORONTO — One way to determine the security of a computer system is to check it against the following security "musts" concerning library procedure:

- Limit access to the library by keeping the door locked at all times or by assigning a full-time librarian, or an operator after normal working hours, to monitor access.
- Prohibit programmer access to production tapes or disks or documentation without written authorization.
- Maintain a log of programs and data files in the library.
- When not in use, store all programs and data files in a locked safe or cabinet whose locks or combinations are changed periodically.
- Instruct the librarian to release programs and files only when computer runs are authorized and scheduled.
- Have the librarian record the return of programs and files after computer runs, thereby providing a record of their usage and a cross-reference between tapes or disks and computer runs.
- Establish special stringent procedures for obtaining sensitive files from the library.
- Use tape reels and disk packs which have special labels which can be detected by a sensor in order to prevent theft.

This checklist was compiled by DCF Systems Ltd., 74 Victoria St., Toronto, Ont. M5C 2A5.

County Turns to DP To Combat Shortages

ST. LOUIS COUNTY, Mo. — This county's purchasing department will soon be using a computer program to alert it 90 days before its commodity supply contracts end, leaving the county time to do a thorough bidding and evaluation process.

The system will be especially important in dealing with hard-to-find gasoline, paper and road building material supplies, according to Kenneth Vaughn, county DP director.

The program, presently in the system design stage, will provide both periodic reports and on-line inquiry and response capability via IBM 2260 CRTs.

Initially the program will respond to contract ending dates or a set limit on reorders. Later the program will tie into an inventory system.

Vaughn said the Cobol program will take between 50K and 60K on an IBM 360/40.

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What's Real About VS?-Part I

'Significant Operational Advantages' Seen Over MVT

By Dr. Bernhard W. Romberg
Special to Computerworld

We think IBM's VS systems environments may be thought of as "oversold," or "depressed." This is unfortunate, since the VS systems can provide significant operational advantages and certainly seem to be the basis for the long-term product plans of IBM.

One of our clients, "Alpha Manufacturing," was operating a substantial DP facility, with multiple 65s and 2314s. Alpha was generally well-satisfied with the cost-effectiveness of its configuration, but

This series has been extracted from a report evaluating IBM's VS, prepared by and available from ADL Systems, Inc., Acorn Park, Cambridge, Mass. 02139.

foresaw considerable growth in its workload largely through new applications, many of which were to be of an on-line nature. (Most of its present work was batch-oriented).

Alpha wanted an equipment plan which would consider alternatives such as:

- Should it expand simply by adding 65s?
- Should it replace the 65s with 158s and possibly look toward a 168?
- If it was to go to either a 158 or 168,

which operating system should it use?

- What should be the general timing of the equipment changes?

Factors to be considered were costs, flexibility, disruption and others. Decentralization, with a possible second site for security purposes, was also an important consideration.

Gross Data

We decided to use very gross benchmark data. Some benchmarks had been run by Alpha, but we also made extensive use of other "data," based on benchmarks run by others. We normalized all this data so that it expressed a "relative capacity" of two CPU-operating system combinations and found the ratio of capacities is essentially the inverse of the ratio of running times.

We compared various configurations all operating under MVT, and certain other configurations under VS2 with configurations under MVT.

We examined in detail certain of the benchmark tests, to obtain a better understanding of the types of file accesses and general I/O activity, the degree of multiprogramming, the general structure of the jobs being run, and the general magnitude of the tests. One can take exception to both the approach and the

(Continued on Page 17)

RDOS Backs Multiterminal Use, Clustered Nova Software Linkup

SOUTHBORO, Mass. — Data General's Real-Time Disk Operating System (RDOS) has been enhanced to include software interconnection of as many as 15 Nova-line minicomputers. The company previously had hardwired interconnection capabilities.

The revised operating system also features a communications package that lets an operator monitor and control the execution of tasks within a program. A multiterminal editing facility that permits up to 16 simultaneous users to work with programs or data files on each processor is also now part of RDOS.

Program Suspension

For users of the Nova 840 in particular, RDOS also includes a checkpointable background capability that can temporarily suspend one program so that another can be run.

Functionally, RDOS Revision 3 sets up communication links among Novas that are connected through Direct Memory Access channels, allowing processor-processor data transfers with minimum overhead. With this support, Data General suggested, processors can be clustered with each doing a particular portion of the total DP job.

The combination of RDOS Revision 3 software and the \$2,100 Multiprocessor Communications Adapter (MCA) also means that the Operating System generated for each of the clustered processors can be limited to just the features needed to accomplish that processor's assigned job. Such tailored software will, in turn, allow more room in each processor for the end-user programs or data files.

The operator communications package lets the system operator keep tabs on how well jobs are being done and then killing, or running tasks set for one-time execution, or queuing tasks for execution periodically.

The ability to support a number of terminals, each able to edit data or programs, is "essential," in Data General's view, for applications such as program development — where one copy of source statements keeps all developers aware of changes, or order entry — where new data is being entered and old data altered on a continuing basis.

The Nova 840 checkpointing facility allows priority jobs to be run in background as they are needed, interrupting but not aborting whatever was running when the rush work arrived.

| Sys. A | 158 (2314) | 158 (3330) | 165 (2314) | 168 (3330) |
|------------|------------|---------------------|----------------------------|------------|
| Sys. B | | | | |
| 65 (2314) | 1.1 | 1.26-1.72 (3 tests) | 1.8 (2314) 2.1 (3330) 3.06 | 1.81 |
| 155 (3330) | | 1.0-1.84 (8 tests) | 1.84 1.91 | |
| 158 (3330) | | | | 1.95 |
| 165 (3330) | | | | 1.13-1.32 |

| Sys. A | 155II | 158 (2314) | 158 (3330) | 168 (3330) |
|------------|---------|--------------------|--------------------|-----------------------|
| Sys. B | | | | |
| 65 MVT | | 1.41 | 1.23 1.30 2.38 | 2.23 2.40 4.00 (2314) |
| 155 MVT | .91 .97 | .95-1.79 (9 tests) | | 2.67 2.32 2.99 |
| 158 MVT | | | .85-1.15 (9 tests) | |
| 165 MVT | | | | 1.03-1.83 (7 tests) |
| 168 MVT | | | .71 | .88-1.60 (7 tests) |
| 158 VS2/R1 | | | | 1.54-2.68 |

In each chart above, the "effective capacity" of System A is compared with System B, rated at 1.0. Each System A configuration in the right-hand chart was under VS2/R1.

Benchmarks

ADL Systems found this comparative data on TSO operations running under MVT and under VS1.

| TSO Benchmark Results | | | | |
|-----------------------|-----------|-----------|-----------|------------|
| | | 155 MVT | | 158 VS2/R1 |
| Number of Terminals | Trans/Min | Re-sponse | Trans/Min | Re-sponse |
| 30 | 44 | 2.6 | 45 | 1.9 |
| 40 | 57 | 3.7 | 52 | 2.3 |
| 50 | 65 | 6.8 | 74 | 2.8 |

'AVR-Plus' Eases DOS Operations

DANBURY, Conn. — DOS/360 users can process a job stream in any partition without changing JCL assignments, if the system software includes the AVR-Plus enhancement package from Universal Software, Inc.

AVR-Plus includes automatic volume recognition and "device equate" capabilities that prevent conflicting I/O assignments, and eliminate the need to maintain duplicate JCL for each partition, the company explained.

The new package facilitates scheduling procedures and minimizes operator intervention. The automatic volume recognition facility allows the user to make assignments to a volume serial number rather than to a specific device.

After reading the JCL, AVR-Plus scans the tape or disk drives for the specified volume and makes the required assignments dynamically. This avoids "Wrong Pack"-type messages and allows the operator to mount tapes or disks on whatever device is available, eliminating the "clerical" effort of matching data set to particular unit.

The Device Equate facility permits the user to establish a table which identifies device assignment relationships for each partition. This table resolves conflicting I/O assignments between partitions for unit record, tape and disk devices, and solves the problem of having devices stand idle (because they've been assigned to a particular partition) while a job is

delayed because properly assigned units aren't available.

AVR-Plus is available for a three-year license, at a cost of \$1,200, or for \$90/mo rental. It is also available in combination with the separately priced DOS Asap spooler package, for \$750, a company spokesman noted.

Universal is at Commerce Park, 06810.

Xerox Processors, Peripherals Linked

ANAHEIM, Calif. — Computer-to-computer communications and sharing of peripherals between two Xerox processors operating under BCM, RBM or CP-R are made possible with the Dual Processor Software (DPS) package from Code Research Corp. (CRC).

DPS allows the satellite to access the host's peripherals in a way that is transparent to the satellite user. When the satellite is used as a preprocessor for data or a control processor for work done within the host, the transfer of data between computers is possible.

CRC modifies the basic DPS software to fit the user's operating system. Prices for the package are in the \$8,000 to \$13,000 range, depending on the tailoring required.

CRC is at 1363 S. State College Blvd., 92806.

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10

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Happy birthday to us.

And thanks to you for helping to make all this possible.



'C/PBS' Batch, On-Line Modules Support Order Entry, Inventory

WEST SIMSBURY, Conn. — Manufacturers, distributors and chain and single store managers can improve product turnover, reduce costs and gain better control of their operations with the Customer/Product Based System (C/PBS) from Computer Covenant Corp.

The order processing and inventory management package, written in ANS Cobol for 360/370s, is designed to provide better customer service levels and to perform product forecasting and support management generally in its buying decisions.

C/PBS includes an optional on-line order-processing facility in addition to more conventional batch processing. It also provides for order allocation and release and back order management to respond to customer needs and their value to the organization.

Order-point analysis and multilevel inventory control are part of the system, as

is purchase order discounting and open purchase order management. Receiving and distribution of incoming items is another feature, the company noted.

C/PBS includes a flexible retrieval and reporting system working against a direct access data base. In addition to all the paperwork needed to support order processing, the system can be used to generate sales budget forecasts and other specific management reports.

Though implemented on 360 or 370 equipment, under either DOS or OS, the system is distributed in source code and could, with some modification, be moved to other CPUs that have an ANS Cobol compiler.

C/PBS requires 94K of memory for the on-line system and at least one disk for the data base. Each module — order processing and inventory management — is available now for \$18,000 from 136 Old Farms Road, 06092.

TSO Users Gain Most Under VS

(Continued from Page 15)

results. Still, we feel they represent a reasonable summary of the fragments of data available, and are adequate for overall planning purposes.

1.2 Times the Power

Three tests of a 65 compared with a 158 all showed the 158 to have more than 1.2 times the power of the 65. Much more extensive tests comparing a 158 in MVT with a 158 in VS2/R1 showed, approximately, a standoff. However, the detailed analysis of these tests showed that if the CPU utilization is less than 60%, there is a throughput increase of VS2/R1 over MVT.

For VS2/R2, we based our assessment upon preliminary results of certain models made available to us by IBM, which suggested a 20% improvement with VS2/R2 over VS2/R1, and used this as the basis for our estimate that a 158 under VS2/R2 would have approximately 1.5 times the "power" of a 65.

All the benchmark data discussed above was for batch work. For on-line systems, one would expect even more significant factors of improvement, including the ability to achieve a higher degree of multitasking, processing more transactions "simultaneously." We found one set of benchmark data which confirms this.

It appears that the VS operating systems will give improvement in throughput, but not anywhere near the order of magnitude which had been widely anticipated.

However, throughput should not be taken as the sole measure. The VS operating systems provide a number of additional capabilities which can significantly enhance "effective throughput," the net work accomplished and other benefits. These factors cannot be measured as objectively as throughput; still, they may be important in the overall performance of a data processing system.

The additional operating system features are evaluated in Part II.

Romberg is president of ADL Systems, Inc.

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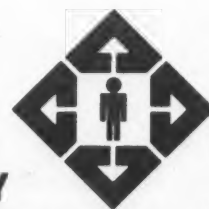
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*Note: Earlier ads had incorrect location for Charlotte. Correct location for both Forums and Exposition is: Charlotte Civic Center, 101 South College Street

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Cobol Chain Files Key to Payables

ANDOVER, Mass. — A new version of the MMS Accounts Payable package from Software International Corp. provides DOS or OS/360-370 users with chain file techniques accessible through Cobol.

The system contains complete vendor financial history, cash commitments by due date in detail and summary form, and a capability of checking for duplicate vendor invoices. Multicompany and multibank options are also included.

The new system uses a Data File which triggers all check writing, and allows the user to vary the payment data, or hold payment on individual vendor invoices or on specific lines on an invoice. By entering dates to be processed, the user can "pull" the chains for those dates without disturbing any others.

If several dates are pulled at one time or if vendors have more than one invoice to be paid in one processing cycle, the system will summarize and generate only one check for each payee.

In addition to analysis for negative or zero balance amounts before check writing, the system creates 14 reports, labels, Rolodex file cards and a vendor master book.

The system is made up of 25 ANS Cobol programs that can run under OS or DOS on a 360 with at least 64K bytes of storage.

The new Accounts Payable package costs \$14,500 (DOS) or \$17,500 (OS).

Software International is at 2 Elm Sq., 01810.

'Quikjob II' Updated

DAYTON, Ohio — Quikjob II, the load-go report writer from System Support Software, now provides both DOS/OS users with TRACE facilities, ACCEPT/DISPLAY verbs for console I/O.

DOS/360 users also gain Isam file creation, standard label support and a multiple input file option with the new Quikjob release. The system is available for \$50/mo from 1132 Donson Drive, 45429.

APL Meeting Planned

ANAHEIM, Calif. — The sixth annual international APL Users Group Conference is scheduled for May 14-17 at the Sheraton Anaheim Hotel here.

Registration (\$40 for regular attendees; \$15 for students) covers all sessions, copies of the proceedings and meals. Requests for information should be addressed to Robert Schaulis, director of the computer center at Coast Community College District, Costa Mesa, Calif. 92626.

The mechanization of the average consumer

A look at automatic consumer systems — in our April 24th Autotransaction Supplement

Those simple little cash registers and friendly neighborhood bank tellers are on their way out, and magic wands, laser optical scanners, on-line terminals and computerized banks are coming in. These new machines and systems can read prices and inventory numbers, check credit, issue immediate sales reports, and even transfer checking funds automatically. And they are completely changing the retail business. It's all called AUTOTRANSACTION, and it's the subject of our April 24th Supplement, edited by Ron Frank.

Ron will examine current systems — what they do for the users, and what they mean to consumers. He'll have case studies and interviews with autotransaction users. And he'll take a look at the future of this infant industry.

If you're involved in this field, you should be involved with this special report. For advertisers, the closing date is April 5th. Contact your Computerworld representative for all the details. Or call Judy Milford at (617) 965-5800.



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155 or 158?

That's the decision faced by many users of large IBM computers. It's a tough decision, but Cambridge makes it even tougher. Because our 370/STOR 155 add-on memory has features that can make your Model 155 processor perform like a 158 – and then some. Take a look at the checklist – and then make your decision:

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|-------------------------------------|--------------------------|--|-------------------------------------|-------------------------------------|
| YES | NO | | YES | NO |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1. Four megabytes of main storage capacity | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2. Dynamic address translation features | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3. Up to 30% more CPU cycles than Model 155 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4. High-speed addressing of main memory | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 5. Use of either VS1 or VS2 operating system software | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 6. 25% less physical floor space than Model 155 from IBM | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 7. Virtually no conversion or installation costs | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 8. No additional storage adapter required for expansion | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 9. Ability to reconfigure main memory | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
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Savings Seen in Consolidation

RJE Terminals Replace CPUs

By Patrick Ward
Of the CW Staff

NEW YORK — By replacing its divisions' CPUs with RJE equipment which accesses a central computer site, Bristol-Myers Co. expects substantial savings, D.R. Knight, the firm's telecommunications manager, believes.

Company headquarters, and the Clairol and Bristol Labs divisions, are already relying on the consolidated computer center located in Stamford, Conn., or running parallel with it, Knight said.

Bristol-Myers has also set up a temporary Midwest consolidated computer center serving two divisions in Indiana. The Midwest center is slated to cut over to the Stamford one in 1975, Knight added.

The company started its move toward centralization in early 1973 by installing a Data 100 RJE terminal in the New York corporate headquarters to access the Clairol Division's CPU in Stamford. A month-long parallel run followed, and then the 360/40 at corporate headquarters was taken out.

The divisions using RJE are doing all the applications they had done before: "everything from payroll on up to IMS data base applications," the spokesman explained.

Smooth Transition

The RJE approach has worked extremely well with relatively few problems, and the transi-

tions to RJE have been on schedule so far, he added.

This first step demonstrated to all the divisions that the RJE system was feasible and would save money, Knight commented.

In November 1973, the company opened its consolidated computer center at another location in Stamford.

Bristol-Myers did not want to place the consolidated center at one of the divisions, and so create the impression that that division "would get some kind of 'preferred' status," Knight mentioned.

The company took out Clairol's CPU this February, replacing it with another Data 100 RJE unit.

In Evansville, Ind., a 3704 front end was added to the Mead Johnson Division's 370/145. Another division in the same state began running parallel with Mead Johnson's computer in February.

By midyear, three more divisions are scheduled to begin relying on the 1M-byte 370/158 with a 3705 front end at the center in Stamford.

Bristol-Myers has standardized the RJE equipment by using either Model 70 or 78 Data 100 terminals with Codex modems.

Batch transmission is at 9,600 bit/sec over 4-wire leased lines in full-duplex mode.

Additionally, GT&E CRTs at Bristol Lab access the consolidated computer center via Codex 4800 modems, and IBM 3270s at the Clairol Division use Codex 7200 bit/sec modems.

In June or July, a New Jersey division will begin transmitting

to the central site at 19.2 Kbit over two lines using Codex Multiplexers.

Data 100 terminals were chosen, Knight said, because that was "the most solvent" supplier looked at. The vendor also had a good field support department and a good reputation among the users Bristol-Myers people talked with, he commented.

Bristol-Myers chose Codex modems, he continued, because it felt the company was the leader in built-in diagnostics at the time, and also offered a dual dial backup option.

The modems used with RJE have this option and it has proven very valuable in allowing continued transmission at up to 4,800 bit/sec if the primary line fails, Knight remarked.

Although Knight said his firm rents the RJE terminals on a three-year lease with a one-year termination option, Bristol-Myers bought the modems.

"We came up with a rather compelling fact," he explained. "At the end of two-and-a-half years the cost to us of the modems would be amortized... and we didn't see anything on the horizon that was going to impact the system."

Modem Converts to RF

NORWALK, Conn. — Teleplex has introduced a digital-to-radio frequency (RF) modem for local mode use over coaxial cables at distances up to about 3,000 feet.

The Teleplex modem costs between \$100 and \$250 from the firm at 327 Connecticut Ave., 06854.

Intrastate Price Cuts Asked For N.Y. Data Access Devices

By Ronald A. Frank
Of the CW Staff

ALBANY, N.Y. — A Public Service Commission (PSC) hearing examiner here has recommended that intrastate charges for Data Access Arrangements (DAA) provided by the New York Telephone Co. be reduced. Also recommended was a credit for DAA users who do not utilize a phone.

The recommendation was the outcome of a complaint first filed in 1972 and was the subject of extensive hearings. The examiner said New York Telephone is "currently collecting excessive DAA rates."

The findings cannot take effect until parties in the case have an opportunity to file briefs and reply briefs. After that the PSC will vote whether to accept the recommendations. This could delay the final decision for about three months, according to one expert.

The examiner, John T. Vernieu, said the rates suggested by the PSC staff were justified and DAA rates should be reduced. The CBS unit which now costs \$6/mo should be dropped to \$4.28/mo; the CBT unit is now \$4/mo and should be \$2.91/mo; and the CDT device should be changed from the current \$2.46/mo to \$1.87/mo.

In addition, the examiner said users who install a DAA but have no need for a telephone should be granted a \$1/mo credit for each line. "Equity mandates rate relief

to a DAA customer... who opts not to take a telephone handset," the recommendation stated.

The original complaint was filed by Dr. Robert J. Robinson, director of the computing center at the state University of New York at Albany. The complaint was filed "as a data user who had a feeling that the rates were too high," said Robinson, who was joined by the Independent Data Communications Manufacturers Association (IDCMA) which agreed the rates should be reduced.

In reaching his recommendations, Vernieu said, "The burden of proof is upon New York Telephone... to justify its DAA rate reasonableness." There is "strong doubt" that the rates are reasonable, he said, and the phone company has been overstating DAA installation hours in addition to relying on "inflated annual maintenance costs."

The findings brought out that the rate development supervisor for New York Telephone, who was a witness at the hearings "had himself neither read the Bell System publications describing DAA installations nor had he ever watched an installation," according to the examiner's findings. It was brought out that New York Telephone failed to undertake any specific studies and that it elected to "rely almost exclusively on judgments" of its staff for figures related to setting the DAA rates.

Carterfone TTY For TWX, Phone

DALLAS — Carterfone is offering a Model 33 teletypewriter terminal that can access both the TWX and telephone networks.

Incoming TWX or DDD calls are answered automatically regardless of the last operating mode used, according to the firm.

If one line is in use, calls to the other line receive a busy signal.

The terminal is available with either a rotary dial or Touch-tone pad.

The terminal leases for \$75/mo including service, with delivery in 30 days from the firm at 2639 Walnut Hill Lane, Suite 223, 75229.

Codex Has Three Alterable, Intelligent Multiplexers

NEWTON, Mass. — Codex Corp. has introduced a series of intelligent time-division multiplexers (TDM) that utilize stored-program memory configurations to assign channels.

The 900 Series includes three models differing mainly in the number of channels which can be supported. The 910 handles up to eight channels, two of which can be synchronous; the 920 supports up to 64 channels, four of which can be synchronous; and the 930 handles up to 64 channels and adds autospeed detection, auto CPU channel

contention and selection and multinode operation.

The TDMs support synchronous channels operating from 1,200- to 7,200 bit/sec and asynchronous channels operating at 75- to 1,800 bit/sec. The channel combinations are limited only by the throughput rates of the modem. For each channel, up to four control signals, as well as data and break signaling, can be transmitted in each direction. The asynchronous channel modules support 5- and 8-level communication codes with up to two stop elements.

Channel configurations can be controlled by four types of memory in the TDM "mainframe," depending on the user's needs: a volatile RAM is remotely programmable; a non-volatile factory-programmable ROM; a dual ROM that can be switched between two configurations; and an alterable ROM that is both nonvolatile and field-programmable.

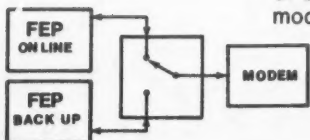
A test panel allows system-level monitoring and reprogramming of all TDMs equipped with alterable memory from a single program panel.

Prices for the 900 Series range from \$2,000 to \$10,000. A typical 32-line system with ROM would cost \$1,800 for the mainframe plus \$150/channel. Lease rates for the same system would be \$90/mo for the mainframe with \$7/mo for each channel.

Also introduced was a compatible version of the Bell 303 data set. The 8300 group band modem can operate only on private transmission networks at speeds from 48- to 64 kbit/sec. The data set costs \$6,500. The firm is at 15 Riverdale Ave., 02195.

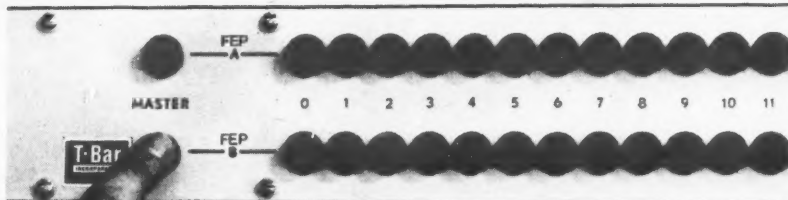
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T-Bar Universal Fall Back Switches have been used successfully to switch various Front End Processors, including IBM 3705, IBM 270X, UNIVAC 1108, Burroughs 5000, Memorex 1270, DEC PDP-11/45.



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Introducing the F

Our new Flexydisks have been specially designed and formulated to provide trouble-free performance on 3740 and compatible equipment utilizing flexible disks.

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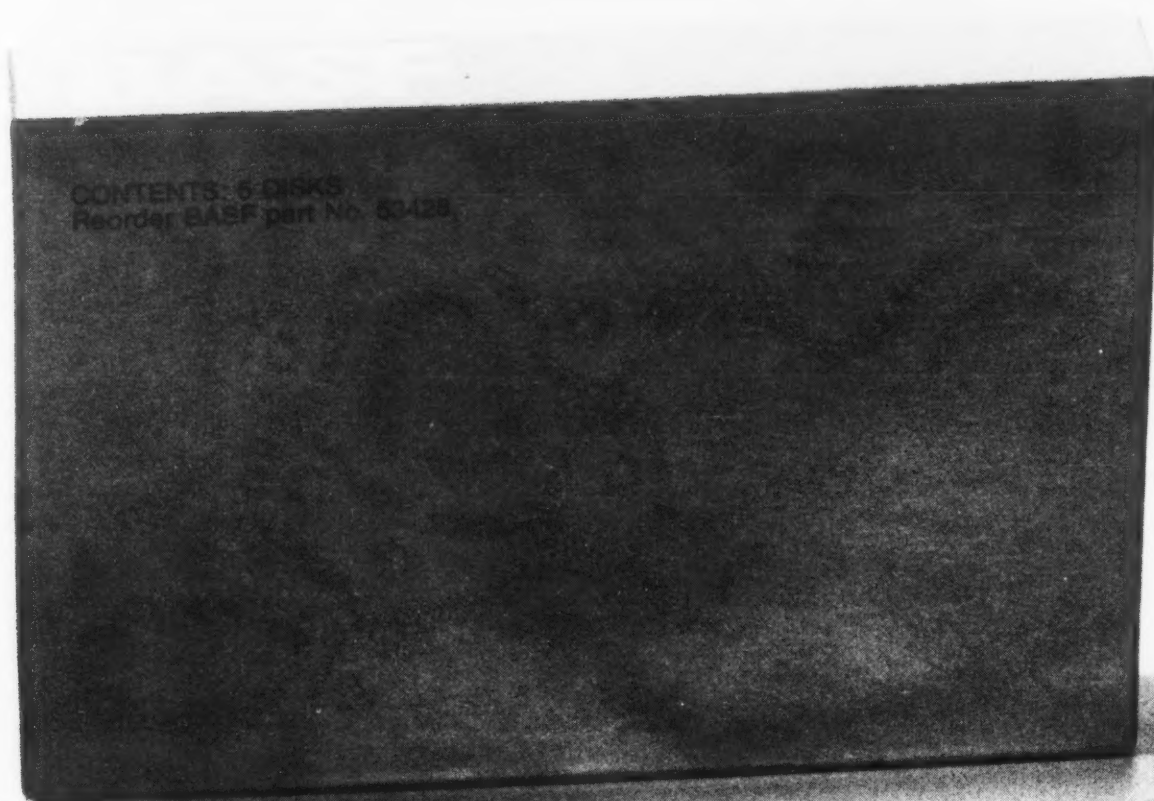
Every Flexydisk 1 is 100% certified so you won't have mistakes to cope with. Each disk is also pre-formatted for immediate use. Flexydisks

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Ultra-smooth coating... our special formulation plus unique finishing method gives Flexydisks longer life. 100% certified to be error-free.

Jacket and liner... supports and cleans disk surface, cutting down on errors.



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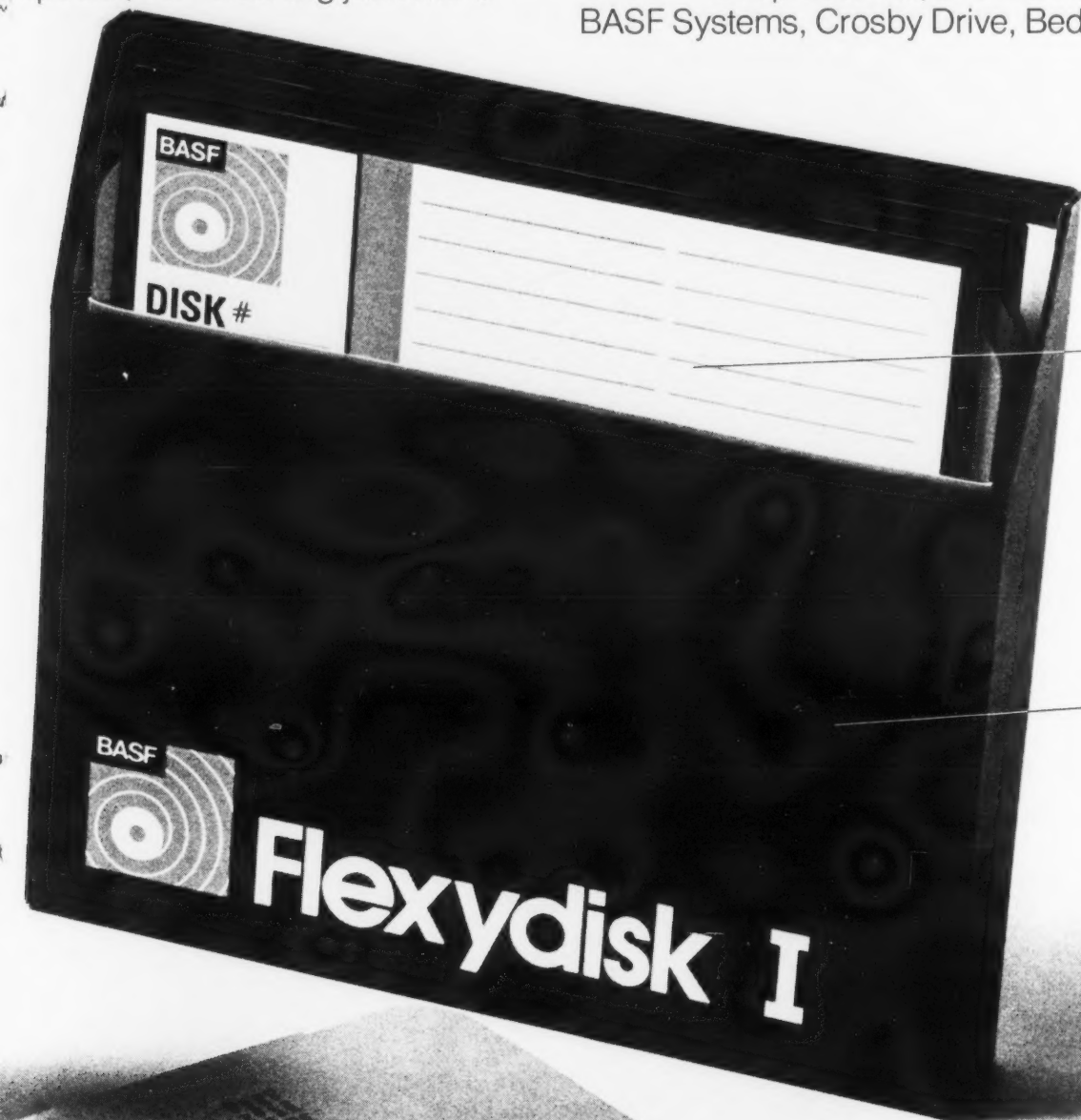
a special, self-cleaning jacket and

liner. This unique method of packaging cuts down on friction and the possibility of errors.

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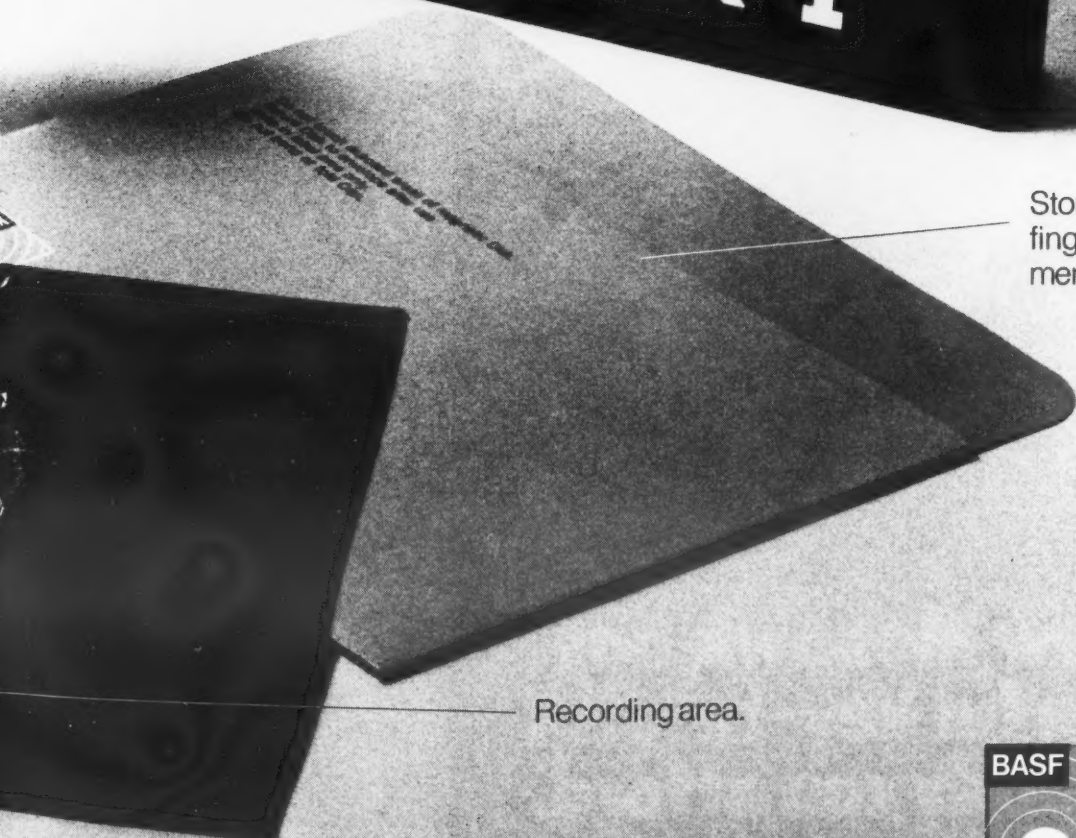
A good product deserves a good package. Flexydisks come in compact, tabulated library 5-packs. They save on storage and record-keeping, and make neat desk-top files. They're a great time-saver. A supply of color coded labels is also included for easy job identification.

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Display Terminal Has 16 Function Keys

ANAHEIM, Calif. — Lear Siegler, Inc. has announced a Data Display Terminal with function and memory capabilities.

The ADM-2 provides the user with flexibility of format, editing, interface and transmission.

The basic keyboard of the terminal is a standard 53-key TTY and, in addition to the 16 function keys, contains a numeric 10-key pad. The CRT utilized in the terminal measures 12 inches diagonally, and can display 960 or 1,920 characters on a 12- or 24-line format. The ADM-2 can display both upper- and lower-case characters.

Features of the terminal in-

clude optional polling, teletype-writer compatibility, and free-form output mode for hard-copy presentation.

When editing, the operator may clear the screen using a destructive cursor for character change, insert and delete characters or insert and delete entire lines. Cursor control also allows

the user to skip, backspace, fore-space, move up, down, return, home and originate a new line. A "field protect" mode is incorporated.

Cost of the ADM-2 is "well under" \$3,000 with deliveries in about three months.

Lear Siegler is at 714 N. Brookhurst St., 92803.

RJE Terminals Have Tutorial CRT

UTICA, N.Y. — A lower-priced remote job entry version of its 2300 family of communications terminals has been added by Mohawk Data Sciences (MDS) Corp.

The 2300 RJE Terminal has a tutorial CRT and a standard typewriter keyboard with key-stroke-controlled setup, both of which are said to help speed the operator through the setup procedure with fewer errors.

A typical 2300 RJE configuration will include a controller with processor and 4K of memory, a 230K-byte fixed-head disk, a standard typewriter-style keyboard, a CRT display, a 300 line/min printer and a 300 card/min reader.

Other printer options include a 30 char./sec printer, a 100 char./sec matrix printer and a 380 line/min chain printer. The system may also be configured to include one or two cartridge tape drives. Software will support IBM 2780 and 3780 communications applications.

Deliveries on the new terminal will begin in August 1974. Typical configurations will rent for from \$595/mo to \$785/mo. The firm's mailing address is Box 362, 13503.

If you're a small user with a small data center, or a big user with small, satellite data centers, look at our new 4- to 12-keystation System 1200.

It has the muscle to let small operations think big. Data purification and reformatting, plus complete range and error checking. And verification, accumulation and editing. All so you'll send clean and accurate data to your mainframe.

And you get your pick of up to 256 different formats. Even RJE communications, when you want to call home.

It's all wrapped up in a single, economical package. Disk, processor and tape drive are included in the compact control unit.

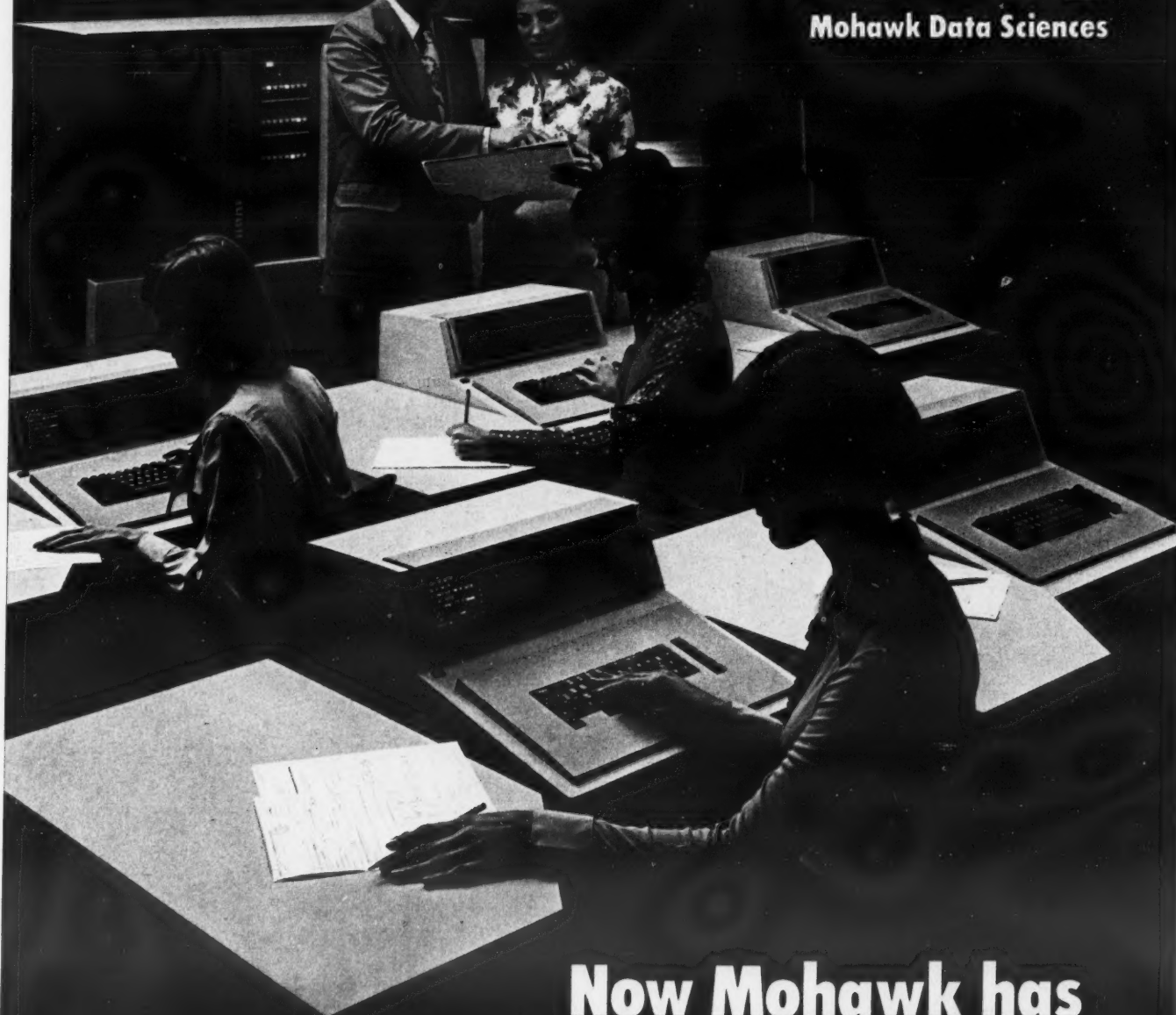
The keystations are the same ones proven for over two years now in our larger System 2400 key-to-disk.

The 1200 has a lot to offer your small data center. A call to your nearby MDS office, or to our headquarters at (315) 792-2424, will bring you the full story.

Find out for yourself why data-entry products like our Data Recorders, our powerful system 2400's and our new compact System 1200 have made our user list the second largest in the industry. Mohawk Data Sciences Corp., Utica, N.Y. 13503.

MDS

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**Now Mohawk has
a powerful key-to-disk
everybody can afford.**

DG Minis Offered CRT Display System

SUNNYVALE, Calif. — Data Disc, Inc. has a low-cost, multi-terminal graphic CRT display system, the 6500, for Data General computers. The system is available with as many as 16 independently operating terminals displaying up to 4K characters each.

The 6500 Graphic Display System features a 512 by 512 point matrix which permits alphanumeric or graphic images. The image on each display is stored in a dedicated portion of a centrally located refresh memory, equivalent to 32K bytes of storage per terminal. The clustered terminal system has a built-in 64 character alphanumeric generator and a graphics generator to keep programming to a minimum. Once an image is written into the display, the refresh memory maintains a flicker-free image on the screen, thereby reducing output loading of the Data General processor.

Full Color

Available with full color capability, the 6500 system can plot continuous or discontinuous functions, complex figures, bar graphs, histograms and annotated graphs. Data can be written light on a dark background or dark on a light background with alphanumeric characters or graphic points positioned anywhere on the screen. Characters may be individually added or deleted without disturbing other portions of the display.

Data Disc offers the graphic display system as an off-the-shelf item, and a 16-terminal system with keyboards, CRTs and a complete computer interface can be purchased for approximately \$4,700 per terminal. The firm is at 686 W. Maude Ave., 94086.

SYSTEMS&PERIPHERALS



GTE IS/1511-B Key-to-Disk System

GTE Expands Key-to-Disk Unit

By a CW Staff Writer

STAMFORD, Conn. — GTE Information Systems has split its IS/1511 and 1514 key-to-disk systems into four models — a lower-cost up-to-four-station "A" series, and a more powerful up-to-32-station "B" series.

Pricewise the IS/1511-A in its maximum four-station configuration would cost \$650/mo and a four-station IS/1511-B would cost \$880/mo with additional stations at \$70/mo including maintenance. New features in the B series are primarily in the system software and include increased record size up to 240 characters, a 480-character display, up to 500 stored formats with up to eight format levels, automatic linking of format levels and automatic generation of tape labels and operator statistics to magnetic tape.

The 1511-B is priced at \$30,350 and each keystation costs \$360.

The "A" series has the same basic features as the earlier 1511 including record size up to 120 characters, 240-character display, up to 240 stored formats and up to eight format levels. The 1511-A costs \$30,350 with four keystations.

The basic hardware for both series includes a 750-nsec memory cycle CPU, 7- or 9-track mag tape (556 or 800 bit/in.) and 24M-bit disk.

The IS/1514-A and -B models are equipped with communications capability and are priced at \$50/mo additionally for the 1514-A and \$100/mo additionally for the 1514-B.

Optional peripheral equipment includes character and line printers at 165 char./sec and 600 line/min, a 300 card/min reader, different tape drives and disk drives.

The communications adapters allow the systems to become remote batch processors that will emulate the communications of IBM 2780 or 3780 remote terminals transmitting data at line speeds up to 9,600 bit/sec, according to the firm.

GTE Information Systems is at One Stamford Forum, 06904.

Systems Houses Utilize Datapoint 2200

By Vic Farmer
Of the CW Staff

The Datapoint 2200 intelligent terminal with its self-contained minicomputer is quickly becoming a center of attention for systems and turnkey houses looking for a minicomputer to attach small business-oriented applications.

But, more importantly, two systems houses have packaged their equipment and related software into bundles that will help users set up their own applications.

One of the more advanced of the systems companies is Omniware Systems, Inc. which was recently launched by Encompass Systems, Inc. of Bethesda, Md., and Control Systems Research, Inc. of Arlington, Va.

The latter two companies have pooled the software resources of the first with the hardware engineering of the second to come up with a small turnkey system with considerable software support. The Datapoint 2200 with 5M bytes of cartridge disk, synchronous communications adapter, card reader, line printer and multiplexer for CRT terminals is priced at \$80,000, and two- and three-year full payout leases are available as well as other hardware options.

But the key to this small system is the software Omniware packs with the system for off-line applications.

Up to eight remote (hardwired or dial-up) CRT terminals may concurrently access the system for:

- Key-to-disk data entry.

- Text processing.
- Letter writing.
- Data file maintenance.
- On-line interactive Cobol source generation.
- Cobol and Fortran documentation systems (including flowcharting).
- Source program maintenance system.
- Tape library system.

With a single user, RPG II and time-sharing Basic are said to be also available. All software is bundled and the firm does not yet offer the software separately.

In addition, the remote job entry systems available include emulators of IBM 2780, 360/20 (Hasp), CDC User 200, Univac DCT-2000 and Univac 1004 terminals, as well as off-line utility routines such as copy and sort/merge.

If the Omniware package is too extensive, the present Datapoint 2200 user can get peripherals that fill gaps in the Datapoint line separately from RDA, Inc., which over the last several weeks packaged, for the end user, peripherals, interfaces and related software it has been using in some of its turnkey systems.

This equipment list includes: three printers, card readers and punches, OCR reader and key-to-tape application and four remote CRT display options.

The RDA 2020 is an Odec Computer Systems printer with a 64- or 96-character set that prints up to 220 line/min and is priced at \$7,500 or \$225/mo on a three-year lease.

The RDA 2030 is a Diablo Hytype printer, upper and lower case, that prints

at 30 char./sec and is priced at \$5,500 or \$190/mo on a three-year lease.

The RDA 2010 is an IBM Selectric printer priced at \$3,380, with the interface alone at \$990.

Two photoelectric punched tape readers, the RDA 4010 and 4025, give read speeds of 150 char./sec for \$2,030 and 300 char./sec for \$2,130. A 75 char./sec punch costs \$2,940, and a combined 75 char./sec punch and 300 char./sec reader is priced at \$3,840.

The four remote CRT displays all provide 24 lines of 80 upper-case characters on 9-inch to 23-inch screens that range in price from \$2,100 to \$2,500.

Probably the most interesting package from RDA is a 6050 turnkey system that includes a Computer Entry Systems OCR document reader, a Datapoint 2200 with 8K memory, and a Wangco 9-track 800 bit/in. tape drive and is priced at \$29,400 or \$680/mo on a five-year lease.

This turnkey system reads OCR-A font on 2-inch by 3-inch to 6-inch by 9-inch documents; corrections are possible with the 2200 keyboard.

In a separate mode, source data may be entered through the 2200 keyboard utilizing the 2200 mini for format prompting and data verification.

The OCR reader and 2200 interface are available separately for \$10,900 or \$250/mo on a five-year lease.

Omniware Systems, Inc. is at 1515 Wilson Blvd., Rosslyn, Va. 22209; RDA, Inc. is at 5012 Herzel Place, Beltsville, Md. 20705.

HP Aims Dedicated Mini Systems at Business Use

CUPERTINO, Calif. — By making some changes in the HP 2100S operating system and designing specific business-oriented applications software, Hewlett-Packard has come up with two dedicated business-oriented data processing systems.

This Management Series of turnkey systems is not designed for the small user, but instead is aimed at the larger user seeking to either delay his mainframe upgrade or postpone it indefinitely by adding a separate data system.

Dedicated to transaction processing, the M230 system will handle typical applications like order entry processing, in which a minicomputer would control up to 32 terminals. In addition to data entry and editing, the M230 will be capable of additional local processing, according to HP.

The M260 system is dedicated to data base management (DBM) with all the linking of files that most DBM systems have on larger CPUs. Some of the typical applications here are inventory control, personnel files and credit verification.

Key system capabilities of the M260 are multiple terminals, intercommunication of data, I/O processing and high transaction throughput. The M230 uses a 16K 16-bit word HP 2100S minicomputer, upgradeable to 32K words. The systems and

operating control software requires 11K words of memory. Transactions can be recorded either on disk or tape. Disk Storage capacities range from 4.8M bytes to 94M bytes and up to four tape units are attachable with either 800 or 1,600 bit/in. densities.

Programming software includes HP Fortran, HP Fortran IV and Extended Assembler. Utility software includes debugging routines, log editor and a library of commonly used procedures such as decimal arithmetic.

Disk file management through the system console permits adding, changing or deleting disk files. Physical file location is managed automatically, and the disk is repacked to eliminate wasted space.

The basic M230 includes a 16K HP 2100S, 5M byte cartridge disk, 1,600 bit/in. mag tape, paper tape reader, 16 channel multiplexer and console CRT terminal. It is priced at \$48,950 or \$2,600/mo including maintenance on a two-year lease. Terminals offered by HP are the character mode HP2615 and the page mode HP2616.

Data Base System

The M260 priced at \$53,950, or \$2,835/mo (two-year lease), uses the same configuration with 24K of memory

and a 30 char./sec printer instead of the CRT console. Data in the M260 system is maintained and manipulated in the HP Image 2000 data base management system software. Up to 32 terminal users can have simultaneous access to a common data base through a teleprocessing option. The data base can be restructured and expanded without altering related applications programs, according to HP. The system reduces data entry and storage costs by reducing data redundancy through network data structures of automatically linked files and records. The system allows data structures to be independent of physical storage devices and programming languages. It also prevents destruction of data or unauthorized person use, HP said.

In creating the data base the user writes down the relationships among the items in his data base in free format language to establish a schema for the data base. The schema is processed and placed on the disk in a route or dictionary file. Batch data is entered in forms ranging from pencil-marked cards to magnetic tape, and reports are produced on the terminal or optional line printer.

The Image 2000 software previously available can be purchased for \$4,000 separately.



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3 Print at 1,000 Line/Min

Versatec Announces Matrix Line

CUPERTINO, Calif. — Three of Versatec's five electrostatic printers, plotters and printer/plotters print at 1,000 line/min and plot at 2.4 in./sec on 11-inch-wide paper. The other two units run at 3 in./sec on 20-inch-wide paper.

The Matrix LP-1175 printer prints 132, 7 by 9 dot matrix characters per line. A character generator produces a standard 64- or optional 96- (upper- and lower-case letters) character set. The unit has both parallel voltage level and serial RS232 standard input connectors for accepting Ascii input data, and is priced at \$5,600.

The Matrix 1110 is a raster scan plotter which operates at 2.4 in./sec paper speed in asynchronous mode. Plotting may be done in an area 10.2 inches wide by any length up to 500 feet. The plotter has a total of 1,024 writing nibs in the stationary writing head (100 nib/in.); 128, 8-bit bytes comprise one scan of plotting data and each data bit relates to one nib in the writing head.

The Matrix 1110 plotter is provided with a one-line buffer and is priced at \$6,400.

Three Modes

The Matrix 1110A printer/plotter operates in three separate modes: printing, plotting and optional Simultaneous Print/Plot (SPP). It eliminates the need for using separate printers and plotters, since both functions are performed by the same unit. The printer/plotter has the same plotting characteristics as the Matrix 1110 plotter, plus the printing characteristics of the Matrix LP-1175, and is priced at \$7,200.

The Model 2030 plotter has 100 nib/in. resolution and a total of 1,856 nibs for plotting across 18.5 inches of 20-inch paper; 232, 8-bit bytes comprise one scan of plotting data. Each data bit relates to one nib in the writing head.

Asynchronous speeds up to 3 in./sec in one direction only at the same dot spacing along the direction of paper travel permit square aspect ratio plotting with exceptional accuracy, according to the firm. The 2030 is priced at \$12,300.

2030A Printer Plotter

The Model 2030A printer/plotter eliminates the necessity for using separate printers and plotters since both functions are performed by the same unit. The printer/plotter has the same plotting characteristics as the Model 2030 Plotter and, in addition, can print 232, 7 by 9 dot matrix characters across the page from Ascii input data. The standard configuration includes full 96 Ascii character set permitting upper- and lower-case printing.

Controllers for 29 computer systems are also available from Versatec, including computers manufactured by Data General, DEC, Hewlett-Packard, Honeywell, Varian, XDS, Interdata, IBM, Teradyne and Raytheon. A Fortran software-plotting package, which has been specifically designed for the raster scan plotting technique employed in Matrix plotters, is also available. Versatec, Inc. is at 10100 Bubb Road, 95014.

FFT Unit Plugs Into Novas

SYOSSET, N.Y. — Elsytec, Inc.'s Fast Fourier Transform Unit, the 306/MFFT, consists of one card, which plugs directly into any Data General Nova mini-computer.

The 306/MFFT also can perform hardware single-precision and some double-precision arithmetic operations.

The price is \$6,000 and interfaces for computers other than the Nova are available and will be quoted on request.

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Disks, Transports Added by Microdata

IRVINE, Calif. — Microdata Corp. has added a series of cartridge disk drives and tape transports to its mini systems. The Series 9000 disk drives provide up to 10M bytes and use 100- and 200 track/in. recording densities in single- and dual-disk configurations. The single-disk version uses a removable IBM 5440-type cartridge and the dual-disk drive adds a permanent rotating disk. Voice coil positioning with an optical position scale and velocity transducer are used and the disks run at 1,500 or 2,400 rpm.

The 5M-byte drive is priced at \$3,900 and the 10M-byte drive is priced at \$4,500.

The 6800 tape transports use 8.5-inch reels, 7- or 9-track, standard densities, in both NRZI and phase-encoded recording formats.

Four drives can be daisy-chained to one formatter. The drives are priced at \$4,000 with NRZI or PE formatter included.

Microdata is at 17481 Red Hill Ave. 92705.

Timer Programmable

SAN LEANDRO, Calif. — A programmable timer board, compatible with DEC 8/e computers, is now available from Douglas Electronics, Inc.

The time base is derived either from a 4 MHz crystal or the 60 Hz line and will produce program controlled time intervals. Time interval counts and counting rates are initiated by IOTs.

The 102-DE-8 is priced at \$350 from the company at 718 Marina Blvd., 94577.

Read-Write Cassettes Ready

NEWTON UPPER FALLS, Mass. — A series of read, write and read-write tape cassette systems is available from Memodyne Corp.

Designated the 100 Series, uses an incremental digital Phillips Cassette-type tape transport. The transport features true "bit-by-bit" acquisition of digital data at incremental steps from 0 to 330 step/sec. Since the tape only advances when data is recorded, substantial tape savings over continuous drives result, in addition to the downtime saved by not having to replace cassettes so often, according to the firm.

Prices vary from \$300 up to \$750 for a complete read-write, TTY/RS232C interfaced system.

Memodyne is at 369 Elliot St., 02164.

\$800 Floppy Controller Interfaces LSI Mini

MOUNTAIN VIEW, Calif. — The Model FDC 101 floppy disk controller, from Minicomputer Technology, interfaces a Shugart Associates SA901 or Century Data Model 140 floppy disk drive to a Computer Automation LSI minicomputer. The controller requires a 1/2 slot in the CPU chassis and controls one or two drives. The format allows over 342K bytes of usable data per drive. CAI-compatible software is included. Prices start at \$800 from the firm at 1901 Old Middlefield Way, 94043.

OEM Products

(While equipment in this column is primarily for Original Equipment Manufacturers (OEMs), in most cases it is also available in single units to interested users. Further, while much of this equipment is not presently available as such to the end user, it does give some indication of techniques and products that may be incorporated into end-user equipment.)

45 Char./Sec Printer Out

HAYWARD, Calif. — Qume Q30 and Q45 printers can print up to 12 copies at 30- and 45 char./sec respectively, and the Q45 can accept unbuffered input from 300 bit/sec data transmission.

Servo-controlled carriage and character-wheel positioning, with ribbon and paper-stepping motors, enable quad-directional moves that increase throughput beyond that of many matrix-type printers, according to the firm.

In quantities of 100, the Q30 is priced at \$1,425; the Q45 at \$1,600 from the firm at 26203 Production Ave. 94545.

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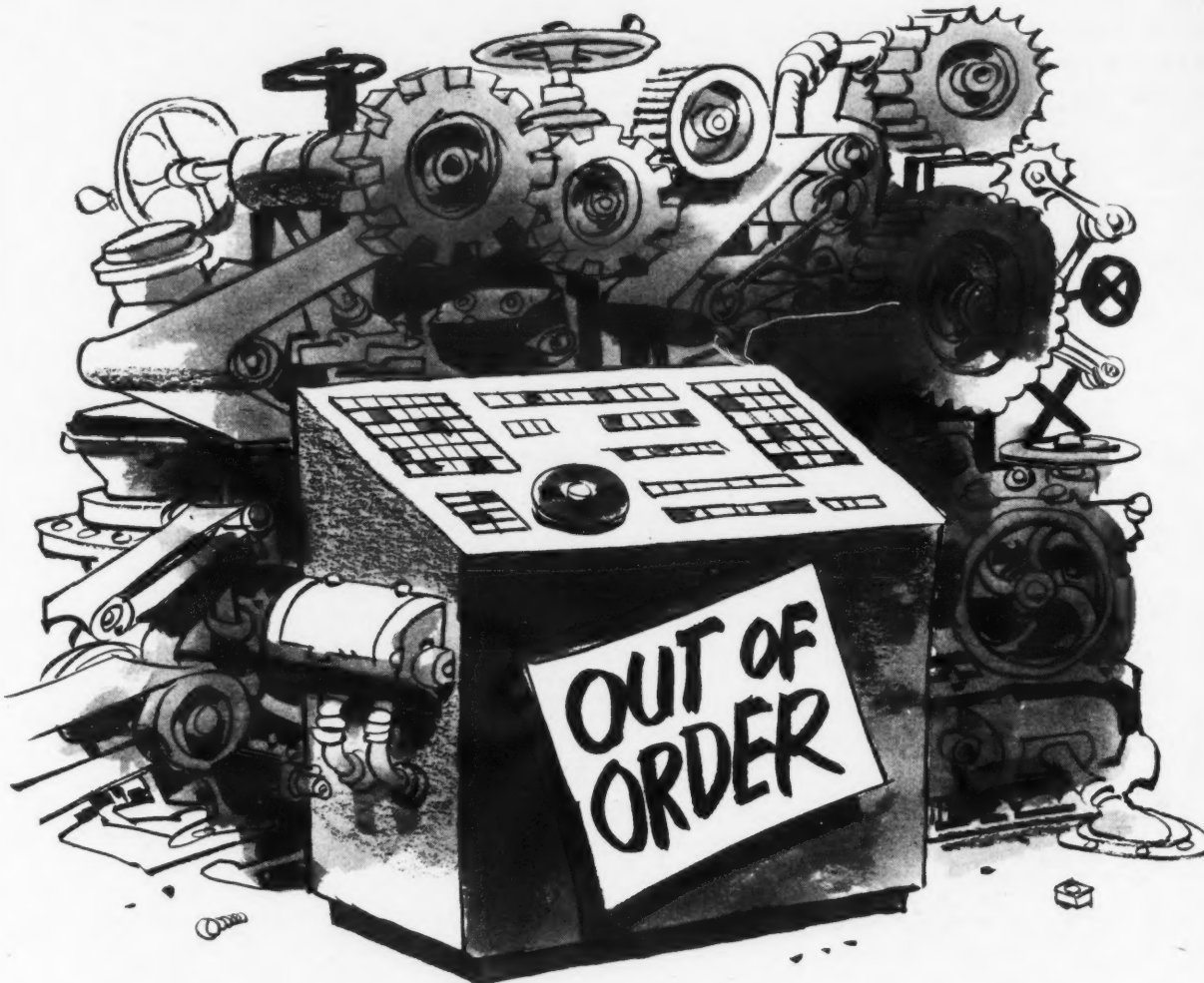
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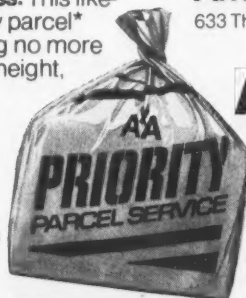
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Performance Evaluation Avoids Adding Third 370

By Patrick Ward
Of the CW Staff

COLUMBUS, Ohio — A performance improvement team, operator incentives and a hardware monitor helped Nationwide Insurance Co. avoid adding a third 370/155 and peripherals, according to Chuck Nelson, director of computer operations for the firm.

In mid-1972, Nationwide had two 370/155s and had ordered a third 155 to replace a 360/50.

The firm was reluctant to acquire another 155 at the time, "but we weren't sure we could do without it," Nelson said.

The firm decided to take a four- to six-month period to see what could be done, and appointed a performance evaluation team.

This group included a staffer from the technical studies division, a systems programmer, an applications programmer from each of the major applications areas and an operations representative.

All were freed from their regular work to concentrate on the task.

The team decided to try loading up one computer system as much as possible, letting the other one ride, according to Bob Phillips, manager of technical studies.

Paul Cherry, then computer operations director and now director of planning,

used a Compress Dataprobe monitor to produce histograms on CPU activity by the end of each shift.

This meant operators "could see the results of how they had loaded the system, and that just created an incentive to load it even more," said Phillips.

If the operators managed to load the system so the monitor showed the CPU 100% active for 120 straight minutes, the computer operations manager promised to buy pizza for the whole shift. And he has.

Nationwide's installation handles 65 on-line CRTs doing inquiry and a slight amount of data entry. These access a 12-spindle disk data base.

Most of the workload, however, is tape sequential batch processing.

The shop has 35 STC 3470 tape drives, mounts 3,600 rolls of tape over a 24-hour day and runs 100,000 job steps a month.

The 2,400-foot, 1,600 bit/in. tapes contain a complete master file of five million auto and fire insurance records and 600,000 life insurance records.

Common Sense Helps

Although the monitor was useful in showing the gains from different changes, Nelson said that "common sense observation" was equally important in spotting bottlenecks.

Both the monitor and personal observa-

tion showed that programs were extensively overlaying, causing wait time for disks. The systems programmer changed the DOS emulator in the OS system to allow programs that were running under the emulator to dynamically overlay.

This change increased the ratio of CPU time to elapsed time, and, along with operator incentive, was one of the major factors in better CPU utilization, Phillips said.

By February 1973, utilization rates had gone from about 30% to 40% to 70% over a six-day week.

To reach these figures, "We have to be above 90% most of the time," Nelson remarked.

The utilization record stands at 98.2% over a 12-hour period, he added.

Nationwide released the 360/50 and cancelled its order for the third 370/155. It finally upgraded in early 1974 by replacing one of the 155s with a 158.

Nationwide will eventually add a third CPU, but the utilization gain has held off the need for it so far, Phillips said.

The performance improvement team is still active, with its leadership rotated, to prevent fallbacks to lower utilization levels.

Keeping these rates high is "really a never-ending process," Nelson stated.

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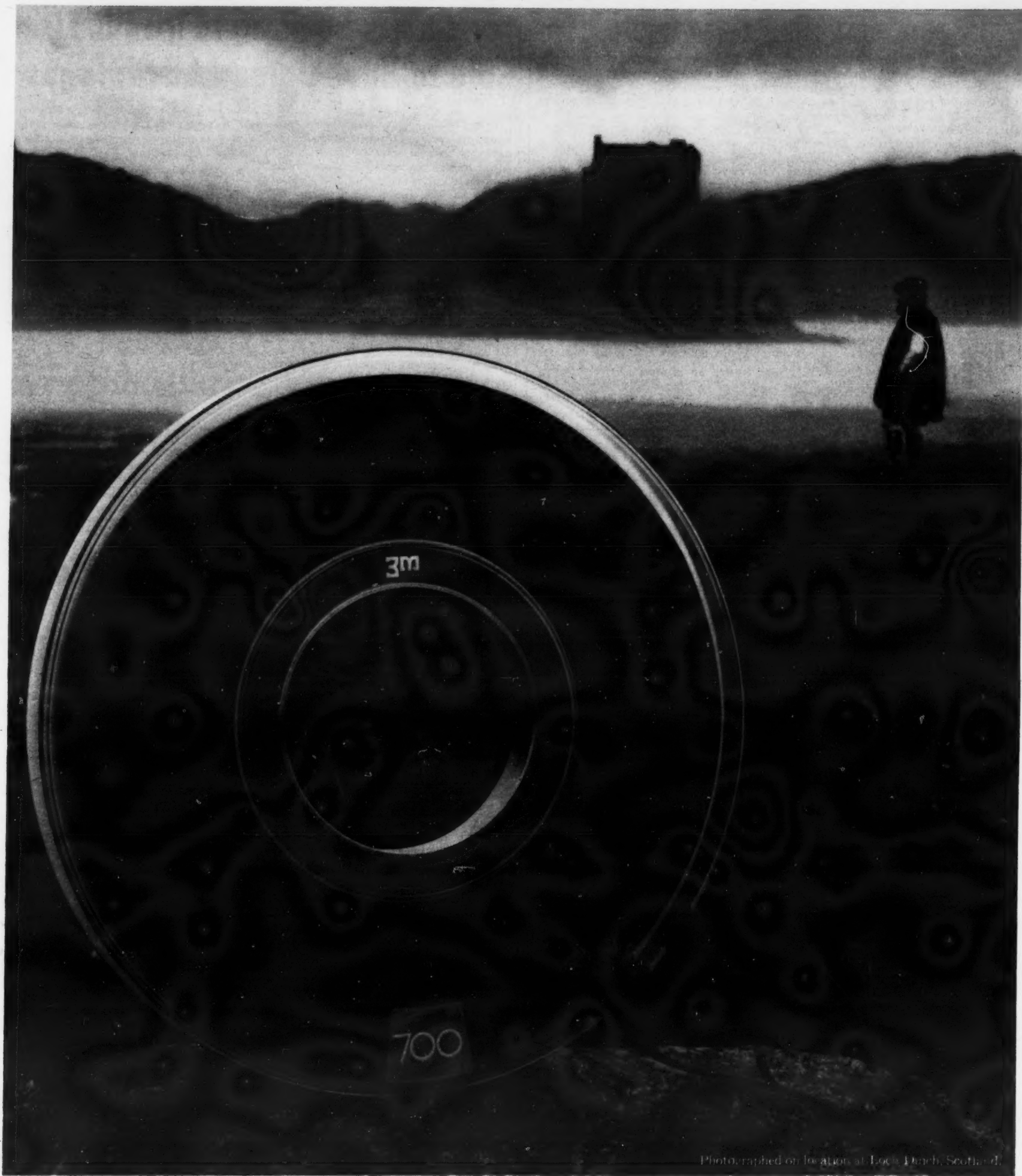
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Data Bank Aids Zoning Probe

NASHVILLE, Tenn. — A centralized data bank is providing answers to all but the whys of zoning irregularities for the district attorney and members of the Metro Council Ethics Committee here.

Programmed to provide detailed information on every zoning ordinance since 1971, the computer contains data that is difficult to put together manually, even though it is part of the public record, officials said.

Drawn from such sources as real property tax files and deed books, the data bank aids the ethics committee's investigation of irregularities in zoning rules and the district attorney's preparation of court suits against zoning violators, according to officials.

The IBM 370/145 maintains lists cross-referencing information on the type of ordinance passed to the councilman responsible for introducing the zoning bill. Answers become readily available to such questions as:

- What zoning has occurred on a

specific street in the last three years?

- Who owns the property affected by the zone change?
- Who owns the property on either side of it?
- When was the property sold and who bought it?
- Which bills have been passed over the mayor's veto?
- Which zone changes have been sponsored by a particular council member?
- Where have most zone changes occurred?

The ethics committee requested that the city's main computer be programmed to answer zoning bill questions on a Thursday. By the following Monday, Nashville's DP and computer services department had the program operating.

"There are just too many bills to wade through," a spokesman for the ethics committee commented. "This is a modern method to get at the information we need."

DP Chiefs Seeking to Rise in Firm Said to Have Unique Advantages

By a CW Staff Writer

NEW YORK — "Systems and DP executives who can join the performance elite have an unusual opportunity to move ahead to new responsibilities," according to Robert L. Crandall, who moved out of DP to become senior vice-president for finance at American Airlines.

Crandall, who acknowledged the role of luck and opportunity in making such transitions, said "performance is the key" for any DPer who wants to move up within a using organization.

But the systems or DP executive, he said, has two great advantages in upward movement that aren't available to other executives in a firm.

First, he explained, the systems executive interfaces with many functional parts of a company so he should have a wider knowledge of the firm than executives with a more narrow functional outlook. Secondly, the DP executive "controls

the resource that has the greatest potential in improving the productivity of the corporation and contributing to increased profits," Crandall said.

Expectations Gap

DP managers have a great opportunity today, he said, to improve their position because of the gap between the expectations of management for DP and what DP is actually producing.

"There is a real opportunity for those executives who can help to close this gap," Crandall continued.

Overall, he said, the role of systems executives in a corporation today is no longer different from the role of other executives, since the systems man is "now expected to aid in solving business problems and not just technical problems."

The DP manager, however, faces certain problem areas that must be overcome, he said.

First, the DP manager is dealing with a rapidly changing environment and must organize to interface effectively with users in the organization — a job that is often hard for strict technical people.

The DP executive "controls the resource that has the greatest potential in improving the productivity of the corporation and contributing to increased profits" — Robert L. Crandall

"The people you send to talk to users must be appropriate," he warned, noting this contact with users could often help give the appearance of successful operations.

Secondly, Crandall believes, planning is particularly important to the DP function since "mistakes can be extremely expensive" and the price tag on planning will get even higher in the future.

Besides the expense, he noted that failures in meeting plans both with the DP systems and their executives cause disillusionment among the top-level executives of the firm.

But at the same time he warned against taking "too narrow a view of planning" — instead indicating that the systems man should aid management in setting priorities for all projects that involve systems throughout the corporation and not just plan for the DP operation itself.

The third area the systems executive must watch concerns the selection and motivation of people, Crandall indicated, since good performance depends on good people.

To do this, the DP manager should emphasize training to show his people opportunities both within the DP function of a company and in other parts of the company, and should emphasize the non-DP side of the department, "which is solving business problems."

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Will Sanders Sue IBM Next?

By E. Drake Lundell Jr.
Of the CW Staff

SACRAMENTO, Calif. — Even though IBM is not mentioned by name, it stands charged of illegal activity in the recently filed Sanders Associates suit against the State of California over the award to IBM for the Teale Consolidated Data Center (see story, Page 1).

This may well mean that a Sanders suit against IBM is not far behind.

In the suit against the state government and the officials in charge of the procurement process, Sanders charged that the contract the state made with IBM is

Analysis

illegal since the state officials "condoned" an illegal tying arrangement forced on them by IBM.

Therefore, several legal sources said last week, Sanders could just as well accuse IBM of using illegal tying arrangements in a suit brought under either the Sherman or Clayton antitrust acts — or both.

So why isn't Sanders suing IBM and not the state for illegal activities?

According to several sources, Sanders and IBM are presently negotiating an agreement that could preclude such a suit.

These sources indicate that when Sanders first threatened to sue IBM over the Teale award, IBM quickly agreed to support Sanders' 2260-type terminals on the 370 as well as the 360, even though IBM previously had withdrawn support for the 2260-type systems on 370 equipment.

IBM continues to claim that the support was not offered as a sop to keep it out of the courts, although Sanders admits it made its complaints about lack of support known to IBM before the decision to sue the state.

Lawyers for the two firms are reportedly still talking, with Sanders claiming it deserves some redress for the damage done to it by the IBM announcement of withdrawal of support.

In addition, Sanders is also said to be concerned about the fact that IBM is integrating more and more functions into the mainframes needed to operate terminals which is making interfacing of terminals with IBM computers more difficult.

If Sanders does go to court with IBM, it would indicate a whole new industry segment entering the legal arena against the industry leader, because to date the terminal manufacturing portion of the industry has not seen itself damaged by IBM and therefore has filed no legal actions.

The peripherals makers, leasing companies and mainframe manufacturers have all been represented in the growing IBM suit business. Perhaps Sanders is getting ready to lead a parade of terminal makers into the same arena.

IBM Director Resigns

NEW YORK — Donald S. MacNaughton has resigned as a director of IBM "to avoid a conflict of interest."

MacNaughton, chairman and chief executive of Prudential Insurance Co. of America, indicated in a memo to Prudential officers that he resigned because Prudential, which has an investment of about \$20 million in a Memorex subsidiary as well as common stock in Memorex, has a lien on any proceeds which may be received from litigation filed against IBM by Memorex.

The resignation was effective last Dec. 28, and was disclosed in an IBM notice to stockholders about the annual meeting which is scheduled for April 29 in St. Louis.

Through Use of Semis, Calculators

Panel Sees Computing Costs Declining

By Molly Upton
Of the CW Staff

NEW YORK — Advances in technology, such as semiconductor memory, and more astute use of less costly devices such as calculators, should bring the cost of computing down over the next several years, according to panelists at an IEEE Intercon session.

On the design front, A.C. Markkula Jr. of Intel Corp. predicted that future systems costs may be reduced by as much as 40%, depending on the type of memory and system configuration.

"Use of semiconductor memory components will lower the overall system cost over the next several years," Markkula said.

Future projections show the typical cost/bit in overhead and components falling in the 1 μ sec core; P-channel dynamic, .5 μ sec; N-channel dynamic, 80 nsec; and lowest of all, the N-channel dynamic, .3 μ sec types of memory.

Rex Rice, director of technology for the Fairchild Commercial Group, said as system costs were being reduced through increased use of integrated circuits, so were access times of main memories, since switching speeds of logic circuits were going up. This meant "we could get many more computing operations in the same time period also coupled with reduced hardware costs," he said.

LSI silicon components have reduced hardware costs to where "we have 'calculating power' purchasable in department stores," Rice said, and "we are on the threshold of providing mass-produced, very low-cost 'computing power' by the coupling of the following items:

- "MOS LSI 'calculator' and 'memory' technology.
- "Macro' functional and control algorithms in Prom/ROM hardware or in RAM (magnetic memory) combinations.

Fear of Foreign Investment In U.S. Called Overreaction

NEW YORK — U.S. firms are overreacting when they fear the "foreign thrust" into the U.S. markets by firms from abroad, said Bernard Mayer, group vice-president of Siemens Corp.

When we consider that the size of the foreign investment in the U.S. is minimal in comparison with the size of U.S. investment abroad, we see how irrational our fears of foreign marketing activities here really are, he said.

Commerce Department figures indicate direct foreign investment in the U.S. totals \$14.4 billion or less than one sixth of the \$94 billion of direct investment abroad by U.S. companies, Mayer added.

Mayer told attendees at an IEEE session on the Foreign Thrust to Capture U.S. Markets, "We can't be for strengthening U.S. investments abroad and at the same time protectionist about overseas investments here."

While essentially agreeing with this philosophy, A.R. Schroter, vice-president international of Rockwell International's Electronics Group pointed out that free trade is "supposed to be a two-way street."

He observed that in some countries, U.S. firms find a "whole network of barriers to our products and our investment."

U.S. industry's answer to Japan and Germany might be, "If you want to fight for our markets, you've got to let us fight for yours. U.S. industry is not going to roll over and play dead. We are going to use every scrap of technological know-how we can muster to cut our costs, improve our techniques and build better

- "Incorporating programmable features on calculator-based systems.
- "Incorporating automatically managed virtual main and file memory on

IEEE INTERCON

calculator-based systems.

- "Providing hard-copy output to the calculators.
- "Providing communication link interfaces."

Rice said "hardware costs have fallen so much that we must reexamine our traditional ideas of centralizing processing by time-sharing over large communication networks."

'Specialized' POS Opportunities Exist for Smaller Organization

NEW YORK — While large corporations fight over the lion's share of the point-of-sale (POS) market, opportunities for smaller organizations exist in specialized product and/or market sectors that are too small for a major POS or electronic cash register terminal vendor to pursue, Thomas F. Horan of Stanford Research Institute advised IEEE Intercon attendees.

While most of the activity within the POS field has occurred in the area traditionally occupied by the higher priced (over \$2,500) data capture devices, the electronic cash register (ECR) will impact the market significantly, Horan noted.

During 1974 and 1975, "the entire price spectrum of available electromechanical

But while hardware costs have declined, in general software costs have risen, Rice noted.

As examples of what can be done to control software costs, he cited the conversion of algorithms to firmware, use of microprogramming, and even hardwiring of software "system" controls such as in the Symbol system at Iowa State University.

Thomas E. Osborne of Hewlett-Packard observed that the pocket calculators are helping the user bring down computing costs.

"Many problems that are now being evaluated on higher cost alternatives are candidates for programmable calculators like the HP-65. As problems migrate to the lower cost alternate so must cost of computing decrease," he said.

cash registers will be matched by electronic devices. Competition will undoubtedly be at an even higher level than it is at present. No problems of installation, training, software development, etc., will exist in the ECR area as it exists in the upper end of the market.

Projections call for total demand for POS registers of all types, both electromechanical and electronic, to be 50% higher by 1980, or about 150,000 units per year, than at the beginning of the decade, he said.

Demand for POS units of the data capture type will grow from one half of total POS demand in 1970 to two thirds by 1980, Horan said.

Horan suggested areas in which firms may find opportunities relating to POS:

- Portable hand-held scanners to assist retailers in performing various inventory control and data entry functions.
- Automatic pilferage detection devices.
- Software systems development for retailers for which a great deal of support will be required.
- Applications of scanners and machine-readable tags and labels to manufacturer's production, distribution and inventory processes.
- Service bureau operation providing on-line or off-line support for retailers' POS systems.
- Service bureau creation of machine-readable tags and labels.
- Designing custom POS systems for special retail application areas.

'Investigate Marketing Abroad'

NEW YORK — "Selling electronic components and equipment in overseas markets could possibly become the most profitable marketing opportunity your company has in the years ahead," Kenneth C. Moritz, vice-president of C. Tennant, Sons & Co. told attendees at the IEEE Intercon session on new international markets.

However, the decision to operate abroad should be based on some sound market investigation, he said.

Exports of communications and data processing equipment accounted for nearly one third of electronic exports in 1973, or \$1.1 billion of more than \$3 billion total, Moritz said.

The DP and communications figure represents a 19% increase over 1972, he added.

Moritz advised attendees to enter markets selectively, approaching mar-

kets with the greatest potential first.

One needs to know price competitiveness, real size (noncaptive segment) of the market, and delivery requirements and ability to meet them.

In addition, such factors as nontariff barriers should be assessed for they may cause one to decide to begin in a different market.

Where local foreign industry is protected by a nontariff barrier, special import certificates can be required on goods — which takes time to procure from the foreign government — before satisfying U.S. licensing procedure.

"There is much intimate information you will require to make a sensible decision as to whether your product can be sold. Some facts are obvious, such as price and delivery; some are obscure, such as nontariff barriers," Moritz said.

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'All Turned Upside Down'

IBM Blasts Telex Appeals Brief

DENVER — The Telex brief to the Circuit Court of Appeals here "has law, economics and normal business conduct all turned upside down — competition is Telex's enemy and it is from competition that Telex seeks to be protected," IBM charged last week.

In a reply to the Telex appeals brief [CW, March 27], IBM charged, "Telex nowhere recognizes the legitimate thrust of competitive intent. Instead it seizes the marks and indicia of legitimate competition and labels them 'predatory.'"

'Supports IBM Contention'

The IBM reply brief said the Telex brief in fact supported IBM's contention that the decision in the antitrust suit should be reversed by the Tenth Circuit Court of Appeals here.

The Telex findings in its brief "attack (without saying so) the basic findings," IBM said, adding that Telex "offers no legal foundation for the judgment either on the findings or on the new claims Telex now submits."

The legal theories put on the record by Telex "are wrong" when taken separately, IBM said. "However, the abandonment of precedent, the attack on competition itself, the dangers for the future and the injustice of the result stand out most starkly when the legal theories scattered through Telex's brief are considered as a whole," IBM added.

The Telex legal theories, IBM said, "are an attack upon competition and an assault on the very heart of the Sherman Act."

The philosophy that underlies the Telex contentions and the district court's decision against IBM contains "error," IBM said, because "it is at war with the competitive system."

"With such a perspective, anything IBM did to compete was wrong. A view which holds competition itself is wrongful leads to labeling IBM as a 'predatory' company with 'predatory' objectives," the IBM brief continued.

'Normal Conduct'

The findings in the case clearly

indicate, IBM said, "that IBM faced with accelerating business losses, necessarily reacted to competitors' lower prices and better terms with its own lower (profitable) prices and better terms. That is normal business conduct and a legitimate business purpose."

In addition, IBM charged that Telex distorted the internal IBM documents introduced into the record, claiming they really show that "IBM did not have an intention to eliminate competitors."

"It is equally plain, we submit, that if IBM had a 'bad' subjective intent Telex would not have been forced to attack and ignore the findings and to miscite and distort the record as it has," the brief said.

IBM Adds to Its Appeal Of Contempt Citation

WASHINGTON, D.C. — IBM has filed a supplemental appeal with the Supreme Court adding to its protest against the \$150,000 per day contempt ruling handed down against it by Chief Judge David N. Edelstein in the Federal District Court for the Southern District of New York.

IBM has already appealed the contempt citation per se, but the supplemental appeal protests

Edelstein's rejection of an IBM motion to enter the contempt citation just against its lawyers and not the firm itself.

The contempt citation — which has been stayed pending outcome of the appeal — was levied because of IBM's failure to turn over certain documents to the Federal government in its antitrust case as ordered by Edelstein.

At the time, IBM lawyers had contended that they, and not the company, should be held in contempt while the issue was taken to higher courts for ultimate resolution and that a light fine, possibly \$100 daily, should be levied in the matter.

However, Edelstein found the company in contempt and ordered the larger fine. "These actions," the IBM filing to the Supreme Court said, "would compel IBM and its counsel Cravath to forego their attorney-client work product privileges upon the fiat of a federal district judge, acting contrary to decisions of this court, of its own court, and of many other federal judges on the same facts."

Edelstein's actions "create a precedent which disrupts the orderly administration of justice — a precedent which the district judge seeks to protect from reversal (sic) by attempting to preclude all routes to appellate review," the brief said.

GA Names 4 Divisions

ANAHEIM, Calif. — General Automation, Inc. has named four product line marketing groups to divisional status: Production Machine Control, 18/30, Special Systems and Communications.

"These new organizations are in line with the company's early plans for long-term growth in high-growth vertical markets," explained President Raymond J. Noorda.

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Syncom Polishing Packs, Preparing for Disk Market

By Molly Upton

Of the Computerworld Staff

BUFFALO, N.Y. — Syncom, Inc., which has been a supplier of tapes for some time, is entering the disk pack market with both used and new packs.

"We think it's a good market," explained President Miles D. Bender.

"We feel that both from a leasing and sales standpoint the market has a long way to go. A lot of the shakeouts have been seen," he added.

"The time in the next four to five years is good, based on the cost of the packs today compared with what they were three or four years ago," Bender noted.

Prices on new disk packs have plummeted, he pointed out. A 2316 pack that cost about \$600 when first produced now sells for around \$160. Now a 3336 costs about \$600, he noted.

"I think the reason the DP business has had such a tough time with the pricing coming down is because it started out and tried to rob everybody. The prices were

way too high in the beginning," he said.

Refurbishing Old Units

Syncom has been buying used packs from large installations upgrading their disk facilities, which it has then refurbished and recertified.

"The total investment is small compared with the lease price available," he explained.

"Whereas five or six years ago packs were costing \$500 to \$600, we can buy these packs now for between \$30 and \$80," he said. Refurbishing costs about \$30 to \$40 a pack. Monthly rental for a 2316 is about \$8.50, which means a payback in about 14 months, Bender observed.

To refurbish the disks, Syncom checks the packs for balance and axial and radial runouts, which determine whether the plates themselves are off balance. Then the packs are run through a test program to detect drop-ins and dropouts, and defective plates are replaced, Bender noted.

Internal parts are replaced as needed.

"About 80% of the disk pack market is leased," Bender estimated. Probably the smaller packs — the 2315 cartridges — are mostly a sales business, but the 2316 and the 1316 are leased, and even the new 3336 is becoming a lease market, he noted.

Bender estimated the annual revenues from the leased disk pack business to be substantially over \$100 million.

The lease market is strictly a used pack market, he explained. "The first guy who gets the pack might have a new one, but seven years later, that pack is still out somewhere. It's brought in, cleaned and recertified, but it's essentially a used pack."

The lease periods are generally 90-day minimum with 30-day cancelable, he said, noting long-term leases generally are not popular with users.

Syncom will sell used packs under the name of Syncom. Syncom also will sell and lease new disk packs.

Consolidated to Sell in U.S.

TORONTO, Ont. — Consolidated Computer, Inc., which has been concentrating efforts on OEM sales abroad, plans to market its key-to-disk products directly to the U.S. and Canada in the near future. Financial support from the Canadian and Ontario governments will enable the firm to engage in lease financing in North America.

Up to \$10 million will be available in additional operating funds during 1974; \$3 million has already been received, the firm said.

Consolidated Computer's new products, the Key-Edit 50 and Key-Edit 1000, have not been introduced to the North American market.

The firm currently markets on an OEM basis through Fujitsu, International Computers Ltd., and Ecodata, a distributor in Brazil.

The firm will be developing a plan jointly with the General Adjustment Assistance Board and with the Ontario Development Corp. to convert a substantial portion of the existing term debt into equity.

Consolidated Computer also announced

Bunker Ramo Sets Reorganization Plan

TRUMBULL, Conn. — Bunker Ramo Corp. has completed the consolidation of the Information Products Division and Information Services Division into the Information Systems Division.

The new division will have three prime profit center departments: Brokerage Systems, Commercial Systems, and Savings Bank Systems.

The Brokerage Systems Department will handle BR's stock, bond and commodity information systems, including communications networks.

The Commercial Systems Department will be responsible for general-purpose terminal systems with special emphasis on commercial banking systems. The Savings Bank Department will handle equipment for mutual savings banks, savings and loan associations and credit unions.

Contracts

Analytical Systems Engineering Corp. has received a \$49,000 contract to develop a vessel traffic system simulation facility design for the U.S. Coast Guard.

Educational Data Systems has been awarded a \$250,000 contract from KMS Industries for EDS-8 multiplexers.

British Airways has assigned United Airlines American marketing rights to its computerized passenger check-in system.

Norway's major commercial banking group, Integrert Databehandling A/S (IDA) has signed a contract with Norsk A/S Philips for a PTS 6000 bank terminal system, including 370 P800 terminal computers and about 1,100 inquiry terminals.

Advanced Memory Systems is supplying Telefunken with an add-on memory for the Telefunken TR 440.

that W.V. Moore, former president of IBM Canada, is being named chairman of the company. He has agreed to serve on a full-time basis for the next few months to assist with plans for direct marketing in North America and financial restructuring.

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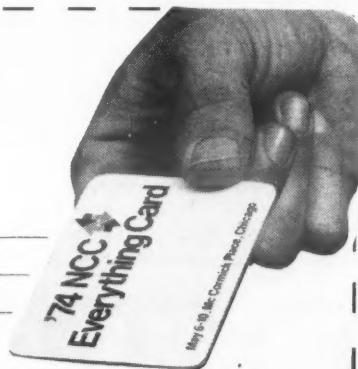
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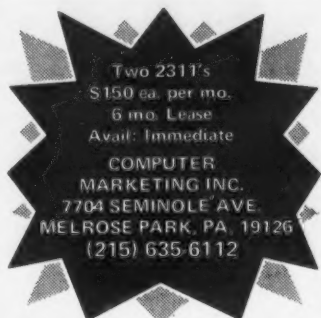
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PB's POS Exit Laid to Loss of Market

NEW YORK — Loss of marketing and technological advantages in the point-of-sale market and the resulting expectations of no more than a minor share of the market were cited as reasons behind Pitney Bowes' decision to withdraw from the field, President Fred T. Allen told a New York meeting of security analysts recently.

The decision to write off \$37 million after applicable income tax recovery resulted in a loss of \$22.4 million or \$1.76 a share — the firm's first loss in 54 years.

Allen explained that the POS market looked enticing when the firm formed Pitney Bowes-Alpex in 1970.

The PBA system "appeared to offer many advantages to the retail industry, . . . had advantages over competitive systems then available or being tested,

and . . . was a leader in the market," he said.

PB, Allen said, "was able to help financially, had an in-place service organization, and a leading role in the retail price-marking, and product and customer identification market."

During the first two years orders were booked "at about the level of our expectations. However, PBA's progress in solving engineering, manufacturing and other startup problems was slower than expected, and resulted in the necessity for an additional \$8 million investment by its parents in 1971 and early 1972.

"By the spring of 1972, the rate of new order increases had begun to fall off, as did customer confidence in Pitney Bowes-Alpex," Allen related.

PB then insisted on a greater role in the management of the joint firm, and as a precondition

for providing \$12 million, gained equal representation on the board.

"By the spring of 1973, it became clear that, despite some improvements, PBA would not meet its budgeted production and income goals, and operating losses would continue at least through 1973," Allen said.

When PB assumed control of the firm in 1973, it undertook a reappraisal of the firm's prospects.

"That appraisal showed that, because of a number of recent developments, including competitive conditions, losses would have continued for the foreseeable future, and substantial investment for new product development and working capital would have been required before operations could have become profitable," Allen remarked.

Efforts to procure a partner were fruitless, as was the attempt to sell the total business.

Two lawsuits have been filed in the wake of the discontinuance of the firm: one by Alpex Computer Corp. and one by an Alpex stockholder.

The Alpex suit, Allen said, claimed PB orally promised to finance PBA to an unlimited extent. "Such claimed oral statements, which are contrary to the terms of our agreements, were never made. There is no basis for this suit," Allen said.

The other suit is based "on approximately the same grounds as the Alpex suit," he said.

Although PB may have withdrawn from the hardware end of the POS market, the firm expects subsidiaries in related areas to benefit from POS.

The Monarch Marking Systems subsidiary "should continue to increase its sales of equipment and supplies" to the POS market, he said.

In addition, PB expects that self-service banking, using magnetic-striped cards, will advance quite rapidly, and the market for more sophisticated cards will be to the advantage of its Malco Plastics subsidiary, which has over 40% of the plastic credit and identification card market.

Terminal Market Called Healthy, Wider Usage to Continue Growth

HOUSTON — The terminal market is healthy and is likely to experience continued growth for a number of years, according to a distributor here.

Thomas W. Moore, president of Tel-Tex, is looking for very strong, rapid growth in the marketplace, especially among common carrier users.

"These users are beginning to use their terminals as computer terminals as well as for communications," he said, "and as they realize the potential of the equipment, the demand increases."

50% Yearly Growth

Tel-Tex, which is celebrating its fifth year in the business, has been growing at an annual rate of better than 50% over the last four years, Moore said. "And the signs indicate this year will be equally as good," he said, "and this is only for the traditional machines."

Tel-Tex currently markets CDI, Techtran, Di-an, Teletype, MI³ and Novation equipment, ranging from portable terminals to acoustic couplers.

TWX, Telex Users Sought

A big boon to the business is TWX and Telex users, Moore said. "Western Union not only

allows its users to connect outside equipment, but encourages the practice," he stated, noting that Western Union had decided to concentrate on providing communication service, rather than terminal equipment.

"This has made a big difference for us in the last six months," he said.

The time-sharing computer terminal market is also growing at a healthy rate, he said.

Timesharing Market Grows

In fact, he said, time-sharing companies are approaching distributors to handle their overflow when equipment demand outruns supply. "It only makes good sense," Moore said, "since they can't sell time unless a terminal is installed."

The teletypewriter terminal user is also changing, according to Moore. Whereas the engineer was using a TTY before, today he is using a CRT, and the schoolteacher has taken over the TTY to teach third graders mathematics.

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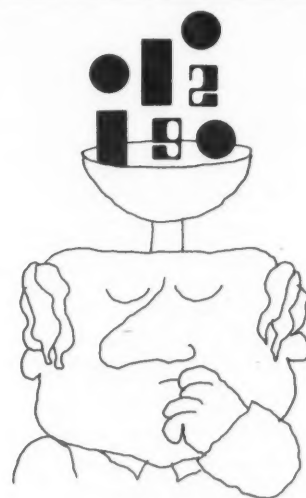
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Keyscan Withdrawal Cited In Inforex Quarter Loss

BURLINGTON, Mass. — Withdrawal of the Keyscan system, plus other adjustments contributed to a fourth quarter loss for Inforex, Inc., even though earnings were up for the year.

Inforex reported a loss of \$1.1 million on revenues of \$10.5 million in the quarter, compared with a profit of \$693,000 or 27 cents a share on revenues of \$7.3 million a year ago.

The company cited effects of currency translation due to the strengthening of the dollar in foreign trade, higher interest rates and the buildup of preintroduction engineering and marketing expenses for new products, including the recently withdrawn Keyscan.

The principal adjustment was a provision of \$500,000 for loss on the Keyscan withdrawal.

Earnings for the year were up, however, to \$1.4 million or 53 cents a share from \$1.2 million or 51 cents a share a year ago.

Revenues rose 63% to \$37.7 million from \$23.1 million in 1972. Rental and service revenues of \$16.5 million were 85% of last year's figure.

Commenting on the results, Chief Executive T.C. Cronin said

the company was able to show an increase in its year earnings during a period of substantial investment in the expansion of its rental base and new product startup costs. He added that ongoing profits did not meet management's expectations, and that a careful analysis is being made of expenses and sources of revenue to improve their balance.

Position Announcements

SYSTEMS ANALYSTS/PROGRAMMERS

Continued growth has resulted in several openings in our systems and Programming Dept. We are looking for the following:

SYSTEMS ANALYSTS — Minimum 3 years' experience in complete systems design including specification writing, client liaison, 3rd generation programming. Computerized photo-typesetting experience is desirable.

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...Toward the Bottom Line

National Cash Register Corp. is scheduled to change its name to the NCR Corp. The proposed change is subject to stockholder approval at NCR's annual meeting in Baltimore on April 17.

\$\$\$

Despite a 20% increase in advance bookings for 1974 and mid-1975, Litton ABS said the "energy crisis" will not affect its ability to fill orders and maintain standard delivery schedules for OEM products.

\$\$\$

Data Products Corp. has consolidated its name and will now be known as Dataproducts Corp.

\$\$\$

Compagnie Honeywell Bull, the French affiliate of Honeywell, Inc., reported 1973 earnings of \$23.8 million on revenues of \$481.8 million, compared with 1972 earnings of \$19.5 million on revenues of \$397.3 million.

\$\$\$

GTE Information Systems, the data service unit of General Telephone & Electronics, incurred a \$19.9 million loss in 1973, compared with a \$227,000 profit a year earlier. The loss was attributed to adverse conditions in the securities industry market, cost overruns on new installations and reevaluation of some equipment.

\$\$\$

Analytical Development Associates has received \$1 million in equity financing to be used to expand Mednet, a medical communications and computation service which enables physicians to send patient data over telephone lines.

\$\$\$

Decision Data Computer has expanded its credit agreement with three banks from \$10 million to \$15 million. The additional \$5 million is available on an open line of credit.

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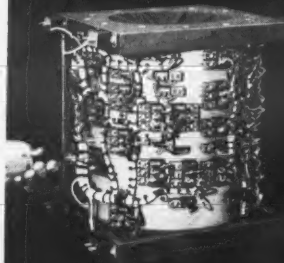
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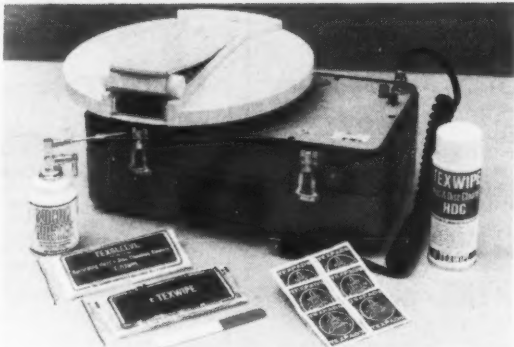
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General Automation Posts Record Half

ANAHEIM, Calif. — General Automation, Inc. reported record results for the second quarter ended Feb. 2.

Earnings reached \$927,000 or 37 cents a share for the period, compared with \$726,000 or 34 cents a share last year. Last year's earnings included a \$250,000 special credit.

Revenues for the quarter were \$14.1 million compared with \$6.2 million in last year's second quarter.

Acceptance

President Lawrence A. Goshorn attributed the results to continuing acceptance of the company's products, particularly the newly introduced LSI-12/16 microcomputer which features a single-chip processor using sili-

con-on-sapphire technology. Shipments of the new unit have begun, a spokesman said.

Record results were also posted in the six-month period when earnings reached \$1.8 million or 72 cents a share. This compares

with \$1.5 million or 68 cents a share earned last year including a \$586,000 special credit.

Revenues were up 117% to \$26.1 million compared with \$12.1 million for the previous year.

Incoterm Nine-Month Figures Up

NATICK, Mass. — Incoterm Corp. reported increased earnings and revenues in the nine months ended Nov. 23.

The company earned \$1.5 million, including a \$568,000 tax credit, compared with earnings of \$436,663, including a \$178,000 tax credit, in the same period a year ago.

Revenues rose to \$12.2 million from \$7.8 million in the cor-

responding year-ago period.

High Backlog

President Jean N. Tariot said backlog at the end of the period stood at \$7.8 million, the highest level in the company's history.

Tariot also noted that fuel shortages affecting airlines have prompted some existing and potential customers to hold back on procurement plans. Consequently, he indicated, revenues and earnings in the fourth quarter will be lower than expected.

Acquisitions

General Instrument Corp. has agreed to acquire the assets and business of American Regitel Corp., a two-thirds-owned subsidiary of Motorola, Inc. Both companies are engaged in the manufacture and marketing of electronic point-of-sale systems.

Recognition Equipment, Inc. and Corporation S have delayed their proposed merger until arrangements for restructuring REI's 7-1/2% convertible subordinated notes reach a more definitive stage.

Pullman, Inc. has agreed in principle to acquire Computer Identities Corp. for an undisclosed amount of cash.

Automatic Data Processing, Inc. has agreed to acquire United Data Processing, Inc. for 90,000 shares valued at approximately \$4.2 million. ADP plans to register approximately 44,000 shares of the stock to be issued to UDP stockholders by May 31.

Datacraft Corp. has been merged into Harris-Intertype Corp., following approval of the \$2.5 million transaction by Datacraft shareholders. Datacraft will operate as a subsidiary of Harris, joining its Systems Group.

Tymshare Ends Year With Record Highs

CUPERTINO, Calif. — Tymshare, Inc. reported record earnings for the year ended Dec. 31.

Tymshare posted earnings of nearly \$2 million or 64 cents a share compared with \$1 million or 34 cents a share a year ago.

Income before tax credits jumped 169% to \$1.6 million from \$597,666 in 1972.

Revenues climbed by 46% to \$24 million from \$16.4 million a year ago, and included record fourth quarter revenues, the firm said.



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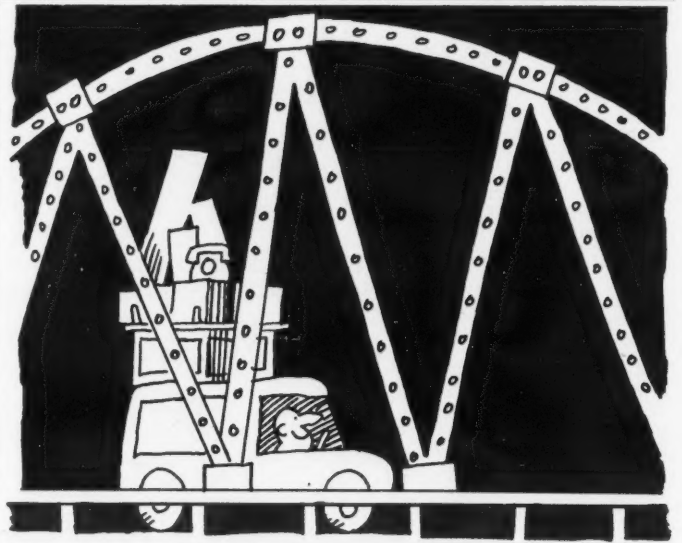
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Earnings Reports

| ITEL | |
|--------------------|-------------|
| Year Ended Dec. 31 | |
| 1973 | 1972 |
| Shr Ernd | \$.74 |
| Revenue | 108,500,000 |
| Disc Op | 4,700,000 |
| Tax Cred | 2,100,000 |
| Earnings | 5,600,000 |

a-Restated to reflect discontinued operations. b-From continuing operations. d-Represents charge for discontinuance of IBM 360 computer leasing operations, offset by a gain from the sale of subsidiary Information Storage Systems, Inc.

| DATA 100 | |
|--------------------|------------|
| Year Ended Dec. 31 | |
| 1973 | 1972 |
| Shr Ernd | \$1.13 |
| Revenue | 42,744,000 |
| Spec Item | 1,397,000 |
| Earnings | 3,375,000 |
| 3 Mo Shr | .37 |
| Revenue | 14,580,000 |
| Spec Cred | 329,000 |
| Earnings | 1,131,000 |

a-Tax-loss carryforward credit. b-Debit; from cumulative effect on year prior to 1972 of a change in accounting in 1972.

| SANDERS ASSOCIATES | |
|----------------------------|------------|
| Three Months Ended Jan. 25 | |
| 1974 | 1973 |
| Shr Ernd | \$.17 |
| Revenue | 39,972,000 |
| Tax Cred | 329,000 |
| Earnings | 773,000 |
| 6 Mo Shr | .47 |
| Revenue | 78,721,000 |
| Tax Cred | 838,000 |
| Earnings | 2,150,000 |

| PLANNING RESEARCH | |
|----------------------------|------------|
| Three Months Ended Dec. 31 | |
| 1973 | 1972 |
| Shr Ernd | \$.10 |
| Revenue | 27,010,000 |
| Spec Chg | 669,000 |
| Earnings | 669,000 |
| 6 Mo Shr | .19 |
| Revenue | 52,265,000 |
| Spec Chg | 2,282,000 |
| Earnings | 1,282,000 |

a-Write-off resulting primarily from discontinuance of contract with American Automobile Association.

| APPLIED DIGITAL DATA SYSTEMS | |
|------------------------------|-----------|
| Year Ended Nov. 30 | |
| 1973 | 1972 |
| Shr Ernd | \$.17 |
| Revenue | 3,805,394 |
| Spec Cred | 232,445 |
| Earnings | 584,320 |

a-From tax-loss carryforward credit less expense from withdrawal of public offering.

| ELECTRONIC ASSOCIATES | |
|-----------------------|--------------|
| Year Ended Dec. 28 | |
| 1973 | 1972 |
| Shr Ernd | \$.61 |
| Revenue | \$44,294,000 |
| aSpec Cred | 39,000 |
| Earnings | (3,924,000) |
| 3 Mo Shr | .29 |
| Revenue | 13,034,000 |
| aSpec Cred | 198,000 |
| Earnings | (3,407,000) |

a-In 1973, tax-loss carryforward credit; in 1972 year, consists of tax credit plus gain on sale of business, less loss from currency realignment; in 1972 quarter, tax credit less loss from currency readjustment.

| STORAGE TECHNOLOGY | |
|--------------------|------------|
| Year Ended Dec. 28 | |
| 1973 | 1972 |
| Shr Ernd | \$1.75 |
| Revenue | 56,596,000 |
| Tax Cred | 1,600,000 |
| Earnings | 5,981,000 |

| COMPUTER SYSTEMS | |
|------------------|---------|
| 1973-74 | 1972-73 |
| RANGE | RANGE |
| 1974 | 1973 |
| CLOSE | CLOSE |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |

| SOFTWARE & EDP SERVICES | |
|-------------------------|---------|
| 1973-74 | 1972-73 |
| RANGE | RANGE |
| 1974 | 1973 |
| CLOSE | CLOSE |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |

| PERIPHERALS & SUBSYSTEMS | |
|--------------------------|---------|
| 1973-74 | 1972-73 |
| RANGE | RANGE |
| 1974 | 1973 |
| CLOSE | CLOSE |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |

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RANDOLPH COMPUTER COMPANY
Division of Firstbank Financial Corporation
A subsidiary of the First National Bank of Boston

Computerworld Stock Trading Summary

All statistics compiled,
computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

| PRICE | |
|---------|-------|
| 1973-74 | 1974 |
| RANGE | CLOSE |
| (1) | 1974 |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |

| COMPUTER SYSTEMS | |
|------------------|---------|
| 1973-74 | 1972-73 |
| RANGE | RANGE |
| 1974 | 1973 |
| CLOSE | CLOSE |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |

| LEASING COMPANIES | |
|-------------------|---------|
| 1973-74 | 1972-73 |
| RANGE | RANGE |
| 1974 | 1973 |
| CLOSE | CLOSE |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

| PRICE | |
|---------|-------|
| 1973-74 | 1974 |
| RANGE | CLOSE |
| (1) | 1974 |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |

| COMPUTER SYSTEMS | |
|------------------|---------|
| 1973-74 | 1972-73 |
| RANGE | RANGE |
| 1974 | 1973 |
| CLOSE | CLOSE |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |

| LEASING COMPANIES | |
|-------------------|---------|
| 1973-74 | 1972-73 |
| RANGE | RANGE |
| 1974 | 1973 |
| CLOSE | CLOSE |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

| PRICE | |
|---------|-------|
| 1973-74 | 1974 |
| RANGE | CLOSE |
| (1) | 1974 |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |

| COMPUTER SYSTEMS | |
|------------------|---------|
| 1973-74 | 1972-73 |
| RANGE | RANGE |
| 1974 | 1973 |
| CLOSE | CLOSE |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |

| LEASING COMPANIES | |
|-------------------|---------|
| 1973-74 | 1972-73 |
| RANGE | RANGE |
| 1974 | 1973 |
| CLOSE | CLOSE |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

| SUPPLIES & ACCESSORIES | |
|------------------------|---------|
| 1973-74 | 1972-73 |
| RANGE | RANGE |
| 1974 | 1973 |
| CLOSE | CLOSE |
| WEEK | WEEK |
| NET | NET |
| CHNGE | CHNGE |



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